

ICS 53.020.99

CCS J 80



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 27545-2024

Replacing GB/T 27545-2011

Horizontal circulating mechanical parking system

水平循环类机械式停车设备

Issued on: September 29, 2024

Implemented on: April 1, 2025

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Types, basic parameters and model designation	2
4.1 Types	2
4.2 Basic parameters	3
4.3 Model designation	3
5 Technical requirements	3
5.1 Service environment conditions	3
5.2 Design and configuration	3
5.3 Performance of the complete system	4
5.4 Manufacture	4
5.5 Installation	5
5.6 Safety	6
5.7 Surface coating	7
6 Test methods	7
6.1 Test conditions	7
6.2 Visual inspection	7
6.3 Maximum single-car entry (exit) time	7
6.4 No-load test	7
6.5 Rated load test	7
6.6 Static load test	8
6.7 Dynamic load test	8
6.8 Hoisting speed and lowering speed	8
6.9 Rated travelling speed	8
6.10 Phase-loss and phase-reversal protection of the supply	8
6.11 Measurement of earthing resistance	8
6.12 Measurement of insulation resistance	8
6.13 Levelling accuracy	9
6.14 Testing of safety protection devices	9
6.15 Noise	10
6.16 Determination of paint film adhesion	10

7 Inspection rules	10
7.1 Classification of inspection	10
7.2 Delivery inspection	10
7.3 Type inspection	10
8 Marking, packaging, transport and storage	12
8.1 Marking	12
8.2 Packaging	12
8.3 Transport and storage	12
References	13

3 Terms and definitions

3.1 horizontal circulating mechanical parking system: a mechanical parking system in which a horizontal circulating mechanism makes the car-carrying devices move round a circuit until they reach the lift or the entry and exit opening, so that cars can be stored and taken out. The entry is quoted from GB/T 26476-2021, 3.1.8.

The terms defined in GB/T 26476 also apply to the document.

4 Types, basic parameters and model designation

4.1 Besides the types laid down in GB/T 26559-2021, 4.2, the systems are divided by circulating mode into three kinds. In circular circulation the pallets move round the circuit along a circular arc in the horizontal plane at the two ends of the system. In rectangular circulation the system is arranged in two rows and the pallets move round the circuit along straight lines in the horizontal plane at the two ends. In multi-row multi-column circulation the number of parking spaces set both lengthwise and crosswise within the plane of the system is greater than two, and the pallets move along straight lines in the horizontal plane. Figure 1 illustrates the three modes.

4.2 The group, dimensions and mass of the cars that the system accepts follow Table 2 of GB/T 26559-2021.

4.3 The model designation is built from the code for mechanical parking systems, the code for the system, the system feature code and a manufacturer-specific code. The feature code follows Table 1 of GB/T 26559-2021; the manufacturer-specific code is decided by the manufacturer. Two worked examples are given: a two-level system hoisted by chain from a manufacturer whose code is P is designated PSXL-P and stated with its size as PSXL-P type, 2 levels; a four-level system hoisted by wire rope from a manufacturer whose code is B is designated PSXS-B and stated as PSXS-B type, 4 levels.

5 Technical requirements

5.1 The ambient temperature for service is $-5\text{ }^{\circ}\text{C}$ to $40\text{ }^{\circ}\text{C}$. Electrical equipment shall work normally at a maximum temperature of $40\text{ }^{\circ}\text{C}$ with relative humidity not above 50%; a higher relative humidity is allowed at lower temperatures, for instance 90% at $20\text{ }^{\circ}\text{C}$. The altitude should not exceed 1 000 m, and above 1 000 m the motor capacity is corrected as required by GB/T 39980-2021, 8.6.3. The service environment shall be free of media that are flammable or explosive, corrosive, or harmful to insulation and to conduction. The supply is a three-phase five-wire alternating current supply at 50 Hz and 380 V; the voltage fluctuation at the point where the feeder enters the system shall not exceed $\pm 10\%$ of the rated voltage, and the internal voltage drop of the system shall not exceed 5%. Service conditions outside this range are settled between the user and the manufacturer.

5.2 Design follows GB/T 39980, and the dimensions of the entry and exit opening, of the parking spaces and of the passage for getting in and out of the car follow GB/T 39980-2021, 9.3. For a single system the maximum single-car entry (exit) time should not be greater than 300 s and the maximum storage capacity should not be greater than 100 parking spaces. The metal structure follows GB/T 39980-2021, 6.10, the steel frame is designed to clause 6 of GB/T 39980-2021 or, at the user's request, to GB 50017, and the seismic calculation of the structure follows GB/T 39980-2021, 6.9. Where the system is installed inside or against a building it shall suit the load-carrying condition of the building. With a car parked normally on the pallet the minimum gap between the cars of adjacent spaces shall be not less than 0.1 m; while the pallet moves, neither the pallet nor the car on it shall foul any object of the parking system, and a safety distance of not less than 0.04 m shall be kept. Parking spaces shall have means that stop oil and water dripping onto the cars below.

5.3 The system shall run normally, brake reliably and be free of abnormal noise, and the mechanisms shall run smoothly and position accurately. In the rated load test the mechanisms shall run normally, the safety protection devices shall act sensitively and reliably, no member of a mechanism or of the structure shall be damaged and no connection shall come loose or be damaged. In the static load test every parking space shall carry a test load of 1.1 times the rated load and the hoisting mechanism a test load of 1.25 times the rated load; afterwards the main load-bearing members shall show no crack and no permanent deformation, no coating shall have peeled off, there shall be no damage affecting performance or safety, and no connection shall be loose or damaged. In the dynamic load test the system shall work normally and the brake and the other safety protection devices shall act sensitively and reliably. The permissible deviation of the rated speed of the hoisting mechanism and of the travelling mechanism is $\pm 8\%$ of the design value.

5.4 The material of the main load-bearing members of the metal structure, such as

columns, cross beams and longitudinal beams, shall have mechanical properties not lower than those of Q235 steel of GB/T 700-2006 or of steel 20 of GB/T 699-2015. Welds shall show no obvious defect visible to the eye; classified according to GB/T 6417.1, the weld quality of the main load-bearing members shall reach level B of GB/T 19418. Butt welds of main load-bearing members shall undergo non-destructive testing: with radiographic testing the acceptance level shall be not lower than level 2 of GB/T 37910.1-2019, and with ultrasonic testing not lower than level 1 of JB/T 10559-2018. Where main load-bearing members are joined by high-strength bolts, the bolts, nuts and washers follow GB/T 1228, GB/T 1229, GB/T 1230 and GB/T 1231, and torshear type high-strength bolt connection sets follow GB/T 3632. Surface preparation of the main load-bearing members shall reach grade Sa 2 1/2 of GB/T 8923.1-2011, and that of the other structural members grade Sa 2 or St 2 by hand.

5.4 (continued) Hoisting wire ropes, sheaves, drums and traction sheaves follow GB/T 39980-2021, 7.3.2, 7.3.3 and 7.3.4; hoisting sprockets and chains follow 7.3.10 and 7.3.11; the brake, which shall be fitted, follows 7.1.1.3; the hydraulic system follows 7.3.15. Pallets shall be made of non-combustible material and have sufficient strength and stiffness, and pallets of one level that have to move both lengthwise and crosswise shall be interchangeable. The electrical design follows clause 8 of GB/T 39980-2021 and the safety requirements for electrics and control follow 9.7. Instruments, push-buttons and operating switches shall have their function marked on the screen and on the control cabinet or console, and the ends of conductors and cables shall carry a mark or a number. A socket outlet for maintenance shall be provided in the machine room or the pit. The lift shall have an emergency stop switch. The lighting circuit shall have its own supply switch, independent of the main power switch. The control system shall have automatic protection and the power circuit shall have short-circuit, overcurrent, undervoltage, overvoltage, phase-loss and phase-reversal protection. The metal structure and the metal enclosures of all electrical equipment, the conduits and trunking, the metal sheaths of cables and the low-voltage side of the transformer shall be reliably earthed, and the earthing resistance of the protective earthing system shall not exceed 4 ohm. With DC 500 V applied between the conductors of the power circuit and the protective earthing circuit, the insulation resistance measured shall be not less than 1 megohm.

5.5 The metal structure shall be firmly connected and free of defects that would reduce its strength, and its installation accuracy follows Table 1. All moving parts shall move freely after installation, without sticking. The relative height difference of the two running rails at the same cross-section shall not exceed 3 mm, the gauge deviation is ± 2 mm, and within 50 mm of a rail joint the misalignment of the top face and of the side face shall not exceed 1 mm; the straightness of the running rails follows Table 2. For the vertical guide rails, joints may be ground, the misalignment at a joint shall not exceed 0.5 mm and the gap shall not exceed 2 mm; the joints of the several guide rails should not lie in one horizontal plane and shall be staggered by not less than 500 mm, and that stagger shall not equal the spacing