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

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Replacing GB/T 30029-2013

Automated guided vehicles - General rules of design

自动导引车 设计通则

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1 Scope

China's national general rules for the design of automated guided vehicles. It specifies the composition and classification of automated guided vehicles, the conditions of use, the design of the system and the design of the vehicle itself, and it applies to the development, design, production, manufacture and application of AGVs. An automated guided vehicle is a robot that moves loads around a building without a driver, and the thing that distinguishes designing one from designing a truck is that the vehicle is the smaller half of the problem. An AGV installation is a system: a fleet of vehicles, a control system that dispatches them, a navigation infrastructure, a charging arrangement, a set of pick-up and drop-off stations, and a building whose floor, doors, lighting and traffic were not designed for robots. The vehicle can be perfect and the installation can still fail because the aisles are too narrow for two vehicles to pass, because the floor joints upset the navigation, because the charging strategy leaves the fleet flat at the shift change, or because the humans working in the same space behave in ways nobody modelled. That is why this standard puts system design before vehicle design and gives the conditions of use a clause of their own. The vehicle requirements themselves cover the structure, the drive and steering, the navigation, the load handling, the energy supply, the control and communication, and the safety - which for a machine that shares a floor with people is the requirement that constrains everything else: speed, stopping distance, detection range and the behaviour on encountering an obstacle are all consequences of it. Issued on 23 May 2023 and in force since 1 December 2023, it replaces GB/T 30029-2013.

This document specifies the composition and classification of automated guided vehicles, conditions of use, system design and automated guided vehicle design. This document

applies to the product development, design, production, manufacturing and application of automated guided vehicles.

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 3797, Electrical control assemblies

GB/T 4025, Basic and safety principles for man-machine interface, marking and identification -- Coding principles for indicators and actuators

GB 4824, Industrial, scientific and medical equipment -- Radio-frequency disturbance characteristics -- Limits and methods of measurement

GB/T 5171.1, Small power motors -- Part

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 30030 apply.

4 Composition and classification of automated guided

4.1 Composition The automated guided vehicle mainly includes a vehicle body, a drive device, an actuator, a safety protection device, an on-board control system, a power supply device, a navigation device, a communication device and a human-computer interaction system.

4.2 Classification

4.2.1 By navigation method Automated guided vehicles can be generally divided into the following types according to the navigation method.

- a) electromagnetic navigation;
- b) magnetic navigation (including magnetic tape navigation and magnetic nail navigation);
- c) optical navigation;
- f) composite type.

5 Conditions of use

5.1 Material characteristics Material characteristics generally include.

- c) center of gravity;

- d) shape and dimensions;
- e) docking method (such as support, lifting, locking, etc.);
- f) others (temperature, corrosiveness, etc.).

5.2 Ground conditions Ground conditions generally include.

- d) groove width;
- e) bearing capacity;
- f) surface hardness;

5.3 Environmental conditions Environmental conditions shall meet the following requirements.

- a) ambient temperature. 0°C~40°C;
- b) ambient relative humidity. 10% ~90%, no condensation;
- c) altitude. less than 2000 m;
- d) air. no flammable, explosive and corrosive gases, no dust. NOTE. For automated guided vehicles used in other environments, the environmental conditions shall be determined by negotiation between the manufacturer and the user.

6 System design

6.1 General requirements System design generally includes process design, operation path design, system capacity calculation, upper control system design, charging (supply) system, navigation system, communication system design, etc. The following requirements shall be considered but not limited to.

- a) system capability (or working rhythm);
- b) working system;
- c) business process;
- d) system redundancy;
- e) interface method with peripheral equipment and systems;
- f) communication method;
- g) charging (supply) method;
- h) emergency operation method;
- i) ground adaptability;
- j) electromagnetic interference. NOTE. The emergency operation mode refers to an

unconventional operation mode in which the automated guided vehicle relies on external power to move the vehicle body when it cannot be controlled normally.

6.2 Process design Determine the system process flow according to the required system capacity (or work rhythm), work system, business process, etc. Consider but not limited to the following requirements.

- a) operation and running mode;
- b) actuator operation process;

6.5 Design of upper control system

6.5.1 Function of upper control system The upper control system shall have functions such as task management, vehicle management, traffic management, and monitoring.

6.5.2 Task management It is used to handle various tasks during the operation of the system, record and count the information of task execution. It shall consider but not be limited to the following functions.

- a) Normal execution of tasks;
- b) Execution of charging tasks or battery replacement tasks;
- c) Task exception handling, including task cancellation, deletion and information change, etc.;
- d) Authority management;

6.5.3 Vehicle management For the scheduling of all automated guided vehicles running in the system, the following functions shall be considered but not limited to.

- a) Vehicle allocation;
- c) Operation control;
- d) Vehicle exit and recovery;
- e) Vehicle fault handling;
- f) Vehicle information collection.

6.5.4 Traffic management Traffic control for all automated guided vehicle operating in the system shall consider but not be limited to the following functions.

- a) Multi-vehicle avoidance;

6.7 Navigation system

b) Structural requirements. 1) Reasonable layout. Easy assembly. Easy maintenance; 2) Reliable matching of parts. No looseness in fastening parts. Marking of key fastening parts.