

ICS 45.020

CCS Q 84



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

GB/T 46097-2025

**General technical specification of fully automatic operation
system for urban rail transit**

城市轨道交通全自动运行系统通用技术条件

Issued on: August 29, 2025

Implemented on: March 1, 2026

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

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1 Scope

This document specifies the general requirements, system composition, system functions, system performance, human-machine interaction, interfaces, power supply, electromagnetic compatibility and protection, environmental conditions for fully automatic operation systems of urban rail transit.

This document applies to the design, development, testing, use, maintenance of fully automatic operation systems for fully enclosed urban rail transit lines.

2 Normative references

GB 8702

GB/T 9254.1

GB/T 9254.2

GB/T 12758

GB 17625.1

GB/T 17626.2

GB/T 17626.3

GB/T 17626.4

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Communication-based train control

A continuous automatic train control system, which is constructed through active train positioning, continuous wireless two-way data communication, onboard and ground computers capable of performing safety functions, without relying on trackside train occupancy detection equipment.

3.2 Fully automatic operation system

A system composed of subsystems related to train operation, such as signaling, rolling stock, communication, integrated monitoring, platform screen doors, suitable for fully automatic operation, which achieves reliable and stable operation of the train without driver or crew intervention through the organic linkage between subsystems.

3.3 Grade of automation

The level of automation in train operation, which is determined based on the division of responsibilities for basic train operation functions undertaken by operating personnel and

the system.

4 Abbreviations

The following abbreviations apply to this document.

AM. Automatic Train Operating Mode ATO. Automatic Train Operation ATP. Automatic Train Protection ATS. Automatic Train Supervision CAM. Creep Automatic Mode CBTC. Communication Based Train Control CCTV. Closed Circuit Television CM. Coded Manual Train Operating Mode EUM. Emergency Unrestricted Manual Train Operating Mode FAM. Fully Automatic Fully Automatic Train Operating Mode FAO. Fully Automatic Operation GOA. Grade of Automation MTBF. Mean Time Between Failures PA. Public Address PIS. Passenger Information System PWM. Pulse Width Modulation RM. Restricted Manual Train Operating Mode RRM. Remote Restricted Train Operating Mode SIL. Safety Integrity Level

5.1 Grade of automation

5.1.1 The train operation automation grade shall reach GOA3 or above.

5.1.2 The system shall be backward compatible with GOA1 and GOA2 functions.

5.1.3 When the highest train operation automation grade is GOA4, the same train shall be able to operate at different automation grades. GOA1, GOA2, GOA3, GOA4.

5.2 Area of automation

5.2.1 The corresponding areas of the main line and wiring harness shall be designated as area of automation; the corresponding areas of the rolling stock depot should preferably be designated as area of automation.

5.2.2 A transition zone shall be set at the boundary between the non-automation area and the automation area; this transition zone shall be on the automation area side.

5.2.3 If the parking and inspection depot, operation depot, train wash depot, throat area of the rolling stock depot are designated as area of automation, the area of automation shall be divided into multiple protection zones; each protection zone shall be equipped with corresponding personnel protection switches.

5.2.4 In the parking and inspection depots and operation depots, main line platforms,

main line parking lines of the rolling stock depot that have been designated as area of automation, dormant/awakening zones can be set up. In the dormant/awakening zones, equipment for waking up trains and verifying their initial position shall be installed.

5.3.1 The system shall be adaptable to unidirectional and bidirectional operation of

trains with different performance and formations.

5.3.2 The system shall be adaptable to the shared-line operation of trains with different performance and formations.

5.4 Safety design principles

5.4.1 Equipment and circuits related to train operation safety in the system shall meet the "fail-safe" principle.

5.4.2 The safety functions and safety integrity levels of equipment in the system shall comply with the provisions of GB/T 28808, GB/T 28809, GB/T 21562.

5.4.3 The system shall follow the fault-oriented safe operation principle and shall have

fault recovery capabilities.

5.5.1 The system's wireless transmission shall adopt continuous bidirectional communication technology.

5.5.2 The system shall achieve transparent transmission based on the IP protocol and

shall record the communication status in real time.

5.5.3 When the system exchanges security-related information, the authenticity, integrity, orderliness, real-time performance of the information shall meet the requirements of GB/T 24339.

5.5.4 A security protection strategy shall be formulated; multiple access control security

mechanisms at different levels and methods shall be available, meeting the information security protection level requirements specified in GB/T 22239.

5.6.1 The system shall adopt CBTC technology and shall have a continuous

communication train control level and an interlocking control level.

5.6.2 The continuous communication train control level shall be the primary level