ICS 45.060
CCS S 70

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 28029.13-2025

Electronic railway equipment - Train communication network (TCN) - Part 4-1: Test methods for train communication networks based on the Wire Train Bus (WTB)

轨道交通电子设备 列车通信网络(TCN) 第4-1部分：基于绞线式列车总线(WTB)的列车通信网络试验方法

Issued on: February 28, 2025 **Implemented on: September 1, 2025**

Issued by: State Administration for Market Regulation;
Standardization Administration of China

Table of Contents

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1.Structure and drafting rules for standardization documents" Drafting. This document is Part 4-1 of GB/T 28029 "Train Communication Network (TCN) for Rail Transit Electronic Equipment". The following parts have been published.

1.Basic structure;

1.Wire Train Bus (WTB);

2.Wire Train Bus (WTB) conformance test;

--- Part 2-3.TCN communication protocol;

--- Part 2-4.TCN application protocol;

5.Ethernet Train Backbone (WLTB);

6.Vehicle-to-ground communication;

7.Wireless Train Backbone (WLTB);

1.Multifunction Vehicle Bus (MVB);

2.Multifunction Vehicle Bus (MVB) conformance test;

--- Part 3-3.CANopen Group Network (CCN);

4.Ethernet Grouped Network (ECN);

1 Scope

China's national standard for testing train communication networks built on the Wire Train Bus. It is Part 4-1 of GB/T 28029 and specifies the test methods by which a WTB-based train communication network, and the equipment connected to it, are verified. The Wire Train Bus is the backbone that runs the length of a train and connects the vehicles to one another. What makes it unusual among fieldbuses is that the network does not know its own shape: a train is coupled and uncoupled in service, vehicles are added and removed, and a unit may be coupled the other way round. So the WTB inaugurates - on coupling it discovers which nodes are present, in what order and in which orientation, and assigns addresses accordingly - and it does this over a two-wire line running through jumper cables and couplers, in an electrical environment dominated by traction current. That is the behaviour a test method has to exercise. Testing conformance to the protocol is only part of it: the network has to be shown to inaugurate correctly with the node counts and topologies that occur in service, to re-inaugurate after a coupling change, to detect and report a broken line, to continue operating through the electromagnetic disturbance a traction system produces, and to behave predictably when a node fails rather than when it is simply absent. This part therefore specifies the test configurations, the equipment, the procedures and the pass criteria for each of those, so that equipment from different suppliers can be shown to work together on a train that neither of them has seen. Issued on 28 February 2025 and in force since 1 September 2025.

This document specifies the general principles, test categories and items for post-installation tests of train communication networks based on the Wire Train Bus (WTB). The corresponding test methods are described. This document applies to all TCN network systems implemented according to GB/T 28029.2.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 17178.1 Information technology Open systems interconnection conformance test methods and framework Part

3 Terms and definitions

The terms and definitions defined in GB/T 17178.1, GB/T 28029.1-2020 and GB/T 28029.2-2020 and the following terms and definitions apply This document.

3.1 valid frame correctframe A frame containing the correct WTB preamble, a certain number of "0" and "1" bits, and a termination delimiter.

Note. For WTB preamble, see

4.8.1.3 of GB/T 28029.2-2020; for bit encoding, see

4.8.1.2 of GB/T 28029.2-2020; for WTB frame length, see The length indicated in the link data length field is consistent with the length indicated in the link data length field. The FCS of the WTB frame refers to the frame check sequence calculation rules in

5.2.1 of GB/T 28029.2-2020. For the termination delimiter, see

4.8.1.4 of GB/T 28029.2-2020.

3.2 Abnormal frame incorrectframe WTB frame preamble error, WTB frame end delimiter error, WTB frame length error, WTB frame FCS error, or WTB master-slave error Frame type mismatch.

Note. The WTB frame preamble code exception means that the WTB preamble code does not meet the requirements of

4.8.1.3 in GB/T 28029.2-2020; the WTB frame termination delimiter is abnormal The WTB termination delimiter does not meet the requirements of

4.8.1.4 of GB/T 28029.2-2020; the WTB frame length is abnormal because the WTB frame length is different from the length of the link. The length indicated in the data length field of the WTB frame does not match; the WTB frame FCS error is based on the frame checksum of

5.2.1 in GB/T 28029.2-2020.