Chinastandards.org

ICS 43.120
CCS T 47

QC

AUTOMOTIVE INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

QC/T 1229-2025

Fuel cell electric vehicles - Refuelling communication protocol

(English Translation)

Issued on: May 9, 2025 **Implemented on: January 1, 1970**

Issued by: Ministry of Industry and Information Technology of the People's

Preview: page 1 of 5 shown, 21 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/qc-t-1229-2025

Chinastandards.org

Table of Contents

Foreword
1 Scope
2 Normative references
3 Terms and definitions
4 Abbreviations and symbols
5 Physical layer
6 Data link layer
7 Presentation layer
8 Definition and requirements of communication data
9 Communication process
10 Performance requirements
11 Test methods
Annex A (normative) Schematic diagram of hydrogen refuelling communication and Interface
Annex B (normative) Connection diagram of hydrogenation equipment
Annex C (normative) Escape and unescape of control characters

1 Scope

This document specifies the type, technical requirements, and test methods for refuelling communication protocol of fuel cell electric vehicles.

This document applies to fuel cell electric vehicles that use compressed gaseous hydrogen.

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 24548, Fuel cell electric vehicles - Terminology GB/T 26779, Hydrogen fuel cell electric vehicle refuelling receptacle GB/T 34425, Fuel cell electric vehicles hydrogen refuelling nozzle

Preview: page 2 of 5 shown, 21 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/qc-t-1229-2025

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 24548, GB/T 26779, GB/T 34425 as well as the followings apply.

3.1 Refuelling communication protocol

During the hydrogen refuelling process, the communication specifications followed by the signal transmission between the fuel cell electric vehicle and the hydrogen refuelling machine via infrared devices.

NOTE: See Figure A.1 in Annex A for a schematic diagram of hydrogen refuelling communication.

3.2 Infrared transmitter

A device used to convert serial data signals into infrared light signals for transmission.

3.3 Infrared receiver

A device used to convert infrared light signals into serial data signals for reception.

3.4 Bit error ratio

The ratio of the number of error bits in the data stream of a channel due to noise, interference, loss, or bit synchronization errors to the total number of bits transmitted over a period of time.

4.1 Abbreviations

The following abbreviations apply to this document.

Application Data. data packet BOF. frame start character CE. escape control character EOF. end of frame character FC. filling command FCS. frame check sequence ID. protocol identifier MP. measured pressure MT. measured temperature OD. optional data RT. hydrogen filling port type TV. total nominal volume of hydrogen cylinder VN. data communication software version number XBOF. additional frame start character

4.2 Symbols

dn. Reference distance from the end face of the infrared receiver to the Z-plane.

dv. Reference distance from the end face of the infrared transmitter to the Z-plane.

rn. Distance between the center of the infrared receiver and the axis of the hydrogen refuelling nozzle.

rv. Distance between the center of the infrared transmitter and the axis of the hydrogen

Preview: page 3 of 5 shown, 21 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/qc-t-1229-2025

refuelling port.

alpha. Effective half-angle of the infrared transmitter.

beta. Effective half-angle of the infrared receiver.

gamma. Adjacent angles of the infrared receivers inside the infrared receiver.

5.1 Modulation method

A reverse return-to-zero modulation scheme is used. An optical pulse represents "0".

No optical pulse represents "1". The maximum pulse duration is 3/16 of the bit time, plus a tolerance of 0.6 μs.

The working waveform is shown in Figure 1.

5.2 Byte frame

Each byte frame shall have one asynchronous start bit, eight data bits, and one stop bit.

Data bits are transmitted serially, starting with the least significant bit and ending with the most significant bit. The baud rate is 38400 b/s.

The byte frame format is shown in Figure 2.

6.1 Control characters

Control characters include XBOF, BOF, EOF, and CE.

6.2 Frame verification sequence

Data transmission is verified using a CRC-16 checksum. The frame check sequence field stores the CRC check value. The frame check sequence shall be transmitted with the least significant byte first, followed by the most significant byte.

6.3 Data link frame

Data packets are transmitted within data link frames. Each data link frame transmission shall contain 5 XBOF characters. A single BOF character shall be transmitted at the beginning of the data frame. Data packets shall begin transmission immediately after the BOF character. The frame check sequence field is sent immediately after the data packet, and the transmission ends with the EOF character.

The data link frame format is shown in Figure 3.

Preview: page 4 of 5 shown, 21 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/qc-t-1229-2025

6.4 Escape characters

Before transmitting data link frames, the sending end shall escape any characters in the data bytes and frame check sequence field that are identical to control characters such as XBOF, BOF, EOF, and CE into non-control characters. If the receiving end receives the escaped control character CE (defined as 0x7D) in the data packet, it shall reverse the escape sequence.

The sending and receiving of control characters shall be escaped and unescaped in accordance with Annex C.

7.1 Data types

All transmitted data shall be in ASCII format.

7.2 Separators

Use the "|" delimiter to separate data segments. All valid data shall be contained between the two delimiters.

See Table 1 for a data example.

7.3 Tags

The two characters following the separator shall be a defined data label. All labels shall be case-sensitive. The third character following the separator shall be "=".

7.4 Character data

All defined character data shall exactly match the defined values and be case-sensitive.

7.5 Digital data

All defined numerical data shall be sent in a fixed format. Empty spaces shall be filled with "0". Data containing extra spaces or characters, or exceeding the defined range, shall be considered invalid.

7.6 Data interval

During the refuelling process, the required data shall be updated in the correct data .....

Preview: page 5 of 5 shown, 21 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/qc-t-1229-2025