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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

ICS 91.140.90

CCS Q 78

GB/T 24476-2023

Replacing GB/T 24476-2017

**Internet of Things for Lifts, Escalators and Moving Walks –
Technical Requirements of Enterprise Application Platform**

电梯物联网 企业应用平台基本要求

Issued on: May 23, 2023

Implemented on: December 1, 2023

Issued by: State Administration for Market Regulation;

Standardization Administration of the People's Republic of China.

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Internet of Things for Lifts, Escalators and Moving Walks – Technical Requirements of Enterprise Application Platform

1 Scope

This Document specifies requirements for the enterprise IoT application platform for equipment, equipment statistics requirements, as well as requirements for equipment basic information, maintenance and inspection information and formats.

This Document applies to the construction, renovation, and expansion of IoT-based enterprise application platforms for lifts, escalators, and moving walkways.

This Document does not apply to the operation of lifts, escalators, and moving walkways controlled by IoT technology.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 7024 Terminology of lifts, escalators and moving walks

GB/T 7588.1 Safety rules for the construction and installation of lifts - Part 1: Passenger and goods passenger lifts

GB 16899 Safety rules for the construction and installation of escalators and moving walks

GB/T 22239-2019 Information security technology - Baseline for classified protection of cybersecurity

GB/T 38656-2020 Specification of data exchange for special equipment IoT system

GB/T 42616-2023 Internet of things for lifts, escalators and moving walks - Technical specification of monitoring terminals

IETF RFC 5246 The Transport Layer Security (TLS) Protocol Version 1.2

IETF RFC 6749 Open Authorization 2.0

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 7024, GB/T 7588.1, GB/T 16899 and the following apply.

3.1 Equipment

It indicates the lifts, escalators, and moving walks.

3.2 People trapped

The phenomenon that passengers are trapped in the elevator car due to elevator failure or incident.

3.3 Enterprise IoT application platform for equipment

The application platform that is established by the enterprise based on the Internet of Things and information technology monitors the real-time status of equipment and is used to quickly handle equipment failures, incidents and alarms. It also has functions such as data management, statistical analysis and data interaction with the equipment safety public information service platform.

3.4 Fault

A condition that could affect or interrupt the normal operation of the equipment.

3.5 Event

The state changes that are expected in the design during the operation of the equipment.

3.6 Alarm

Operation of the emergency alarm system in the cage of lift.

NOTE: For emergency alarm systems, refer to GB/T 7588.1.

3.7 Monitoring terminal

A general term for protocol conversion devices, external sensors, data acquisition and transmission devices, image acquisition devices, alarm triggering devices, in-cage of lift display devices, and voice control devices.

NOTE 1: Relevant regulations may require public domain image acquisition and the display content of in-cage of lift display devices.

NOTE 2: The monitoring terminal may be integrated into the equipment.

[SOURCE: GB/T 42616-2023, 3.3]

3.8 Equipment code

The unique code representing the equipment marked on the special equipment registration certificate.

4 Abbreviated Terms

The following abbreviated terms are applicable to this Document.

PDF: Portable Document Format;

RESTful Web API: Representational State Transfer Web Application Programming Interface.

5 Requirements for Enterprise IoT Application Platform for Equipment

5.1 Platform boundaries

A schematic diagram of the boundaries of the enterprise IoT application platform for equipment is shown in Figure 1.

5.2 Basic requirements for platform

5.2.1 The platform design shall be comprehensively planned, fully considering data resource sharing and interoperability with the equipment safety public information service platform.

5.2.2 Qualified maintenance personnel or organizations shall perform technical maintenance of the system. Maintenance work shall at least include timely updating, organization, and backup of relevant data.

5.2.3 Platform failures shall not affect the security and integrity of the platform's basic data.

5.2.4 The platform shall be able to adapt to data storage requirements, have sufficient query and retrieval capabilities, and permanently store equipment fault, event, alarm information, and the handling information in 5.3.3.

5.2.5 The platform shall be able to provide the information specified in Tables 1 and 2, as well

as Tables 1, 2, 3, and 4 of GB/T 42616-2023 (excluding fault, event, and alarm information during maintenance operation or emergency electric operation) to the equipment safety public information service platform.

5.2.6 Data generated during platform operations must clearly define ownership, responsibilities, and obligations.

5.3 Platform functions

5.3.1 The platform shall include:

- a) Basic equipment information management, see Table 1;
- b) Receiving and handling fault, event, and alarm information;
- c) Equipment statistics for the enterprise IoT application platform for equipment in Clause 6;
- d) Equipment statistics in Table 3 of GB/T 42616-2023;
- e) Inspection information, see Table 2;
- f) Equipment insurance information (if any), see Table 2;
- g) Maintenance information (maintenance personnel, maintenance date, maintenance duration, maintenance results, etc.), see Table 2;
- h) Image system (if any), see Section 5.6;
- i) Communication and dispatch system (if any), see Appendix A.

5.3.2 The platform shall respond to all service categories in Table 2 and prioritize handling trapped personnel and alarm signals.

5.3.3 If the equipment fails, the maintenance organization shall report the failure classification according to Table B.1 in Appendix B after completing the service.

5.4 Platform safety

5.4.1 The platform shall have a robust application safety guaranteeing mechanism, be able to authenticate the identity of logged-in users, and record user operations (such as data entry and modification, etc.).

5.4.2 The platform shall meet at least the Level-2 safety protection requirements in GB/T 22239-2019.

5.4.3 The platform shall implement technical measures to monitor and record the processing of user information, and retain network logs of relevant events for at least 6 months.

5.5 Platform data management

5.5.1 The platform shall be able to accurately receive equipment fault, event, alarm, statistical information, and real-time operating status information; and provide the information specified in this Document to the equipment safety public information service platform.

5.5.2 The platform shall be able to query the information specified in 5.2.5.

5.5.3 The platform shall be able to maintain basic equipment information (see Table 1) and maintenance and inspection information (see Table 2).

5.5.4 The platform shall exchange data with the equipment safety public information service platform in accordance with the requirements of Clause 6 in GB/T 38656-2020, using a RESTful Web API. For interface design, refer to Appendix C.

5.5.5 The platform shall be able to detect the offline status of a monitoring terminal within 30 min.

5.5.6 The platform shall be accessible by the equipment safety public information service platform and provide the information specified in 5.2.5.

5.5.7 Data transmission and storage between the platform and the equipment safety public information service platform shall have security policies, such as data encryption and permission management for remote data access.

5.5.8 The platform may provide the specified images to the equipment safety public information service platform.

5.6 Image System (if any)

5.6.1 The image system primarily includes image acquisition, image access, video encoding/decoding, image storage, image management and application, and image display, etc.

5.6.2 The imaging system shall provide the following basic functions.

- a) Stored images shall have a resolution of at least 640×480, with a frame rate of at least 15 Hz for dynamic image storage; the pixel count of stored images shall be at least 640×480.
- b) Image information stored in the enterprise IoT application platform for equipment as specified in 5.4.2.2b) of GB/T 42616-2023 shall be retained for at least 4 years. The system shall support retrieval of stored image data by various methods, including image source, recording time, and alarm category, etc.
- c) Image file protection measures shall be implemented to prevent tampering or ensure file integrity.

6 Requirements for the Equipment Statistics Information of the Enterprise IoT Application Platform for Equipment

6.1 General

See Appendix B for the classification of equipment failure and non-equipment failure phenomena.

6.2 Fault statistics

During the preset time period, the failure-related trip rate shall be calculated according to Formula (1); the equipment failure-related trip rate shall be calculated according to Formula (2); and the non-equipment failure-related trip rate shall be calculated according to Formula (3).

$$P_t = \frac{T_g}{T_f} \times 100\% \quad \dots\dots\dots (1)$$

$$P_{t1} = \frac{T_{g1}}{T_f} \times 100\% \quad \dots\dots\dots (2)$$

$$P_{t2} = \frac{T_{g2}}{T_f} \times 100\% \quad \dots\dots\dots (3)$$

Where:

P_t – failure-related trip rate;

P_{t1} – equipment failure-related trip rate;

P_{t2} – non-equipment failure-related trip rate;

T_g – failure-related trip time;

T_{g1} – equipment failure-related trip time;

T_{g2} – non-equipment failure-related trip time;

T_f – time when the equipment shall provide service within the preset time period.

6.3 Statistics of trapped personnel

During the statistical period, the trapped personnel rate shall be calculated according to Formula (4); the trapped personnel rate due to equipment failure shall be calculated according to Formula (5); and the trapped personnel rate due to non-equipment failure shall be calculated according to Formula (6):

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