



SLOVENSKI STANDARD
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Transportne storitve Hyperloop

Hyperloop Transport Services

Hyperloop-Systeme - Hyperloop-Transportdienstleistungen

Services de transport Hyperloop

Ta slovenski standard je istoveten z: prEN 17929

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ICS:

03.220.99	Druge oblike transporta	Other forms of transport
55.020	Pakiranje in distribucija blaga na splošno	Packaging and distribution of goods in general

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Hyperloop Transport Services

Services de transport Hyperloop

Hyperloop-Systeme - Hyperloop-
Transportdienstleistungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/CLC/JTC 20.

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European foreword

This document (prEN 17929:2022) has been prepared by Technical Committee CEN/CLC/JTC 20 “Hyperloop systems”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

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Introduction

The purpose of this document is to describe and define the transport services provided by the hyperloop system. The hyperloop is a new mode of transportation for passengers and cargo. As such there are two main types of hyperloop transport services: one for transporting passengers and the other one for transporting cargo. These services are having fundamentally different characteristics from each other. These characteristics impose different requirements on the hyperloop system. Different aspects of each service in relation to the hyperloop system need to be analysed and specified. A standardized method to clearly distinguish between those by specifying the attributes that characterize each of these services is necessary for the concept of operation of the hyperloop system.

Identification of patent holders, if any.

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1 Scope

Hyperloop transport services are designed to support passenger transport and cargo transport. For each of the transport service passengers/cargo requirements and expectations are different. This document defines the hyperloop transport services supported by a hyperloop system and provides means for characterization and description of these services. The characterization considers the technical as well as operational/commercial features of each transport service. This standard provides a framework for defining the transport services of the hyperloop system and its operational concept(s).

The following are within the scope of this standard:

1. the high level description of the hyperloop system and its operating principles for both passenger and cargo transport;
2. system boundaries and interfaces;
3. the classification of the key stakeholders and users of the hyperloop system for hyperloop transport services;
4. the definition of the key service characteristics and requirements of the hyperloop transport services;
5. the identification of related services and their characteristics;
6. common high-level scenarios for different hyperloop transport services from the passenger/ cargo transport point of view.

2 Normative references (standards.iteh.ai)

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

FprCEN/CLC/TR 17912, *Standards Inventory and Roadmap*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

hyperloop

hyperloop is a mode of land transportation capable of high speed and driverless operations, in which a vehicle is guided through a low pressure tube or system of tubes, for passengers and/or cargo

prEN 17929:2022 (E)**3.2****customer**

organization or person that receives a product or service

EXAMPLE Consumer, client, user, acquirer, buyer, or purchaser.

Note 1 to entry: A customer can be internal or external to the organization.

[SOURCE: ISO 9000:2015, modified – added ‘service

3.3**customer experience**

customer experience is the customer’s perceptions and related feelings caused by the one-off and cumulative effect of interactions with a supplier’s employees, systems, channels or products

[SOURCE: Gartner]

3.4**capacity**

capability of a hyperloop to handle a certain level of throughput for passengers and / or cargo

3.5**person with disabilities****person with reduced mobility**

person with disabilities and person with reduced mobility means any person who has a permanent or temporary physical, mental, intellectual or sensory impairment which, in interaction with various barriers, may hinder their full and effective use of transport on an equal basis with other passengers or whose mobility when using transport is reduced due to age.

[SOURCE: Commission Regulation (EU) No 1300/2014] rds/sist/6678c40e-cf6a-4b82-b971-

6bbcc8b4f0ea/osist-pren-17929-2023

3.6**stakeholder**

individual or organization having a right, share, claim, or interest in a system or in its possession of characteristics that meet their needs and expectations

[SOURCE: ISO/IEC / IEEE 15288:2015]

EXAMPLE End users, end user organizations, supporters, developers, producers, trainers, maintainers, operators, disposers, acquirers, supplier organizations and regulatory bodies.

3.7**user**

individual or group that interacts with a hyperloop or benefits from a hyperloop during its utilization

Note 1 to entry: this definition is adopted from [SOURCE: ISO/IEC 25010:2011]

Note 2 to entry: the role of user and the role of operator are sometimes vested, simultaneously or sequentially, in the same individual or organization. [SOURCE: ISO/IEC 25010:2011]

4 Hyperloop System

The hyperloop is an electrically powered mode of land transportation with vehicles travelling through a network of low-pressure tubes, capable of high-speed and driverless operations, offering continuous service for transporting passengers and cargo towards their destinations.

The hyperloop system uses magnetic forces for levitation, guidance and propulsion. Magnetic levitation is one of the key features of the hyperloop system. This eliminates the direct contact between the moving and static parts of the system. The pressurized hyperloop vehicles operate inside a low-pressure tube. The low-pressure environment reduces both air resistance and energy consumption. The body of the tube lowers noise emissions towards the direct environment.

The hyperloop linear infrastructure enables controlled traffic flow of vehicles through a low pressure tube or system of tubes that are either elevated on columns above the ground, at ground level, or go underground/underwater. The spatial constraints need to be taken into account when designing the hyperloop transport service.

5 System Goals and Objectives

5.1 General

The hyperloop transport system defines the goals and objectives for the system through the range of services offered to its users in two main areas:

- Passenger transport
- Cargo transport

The range of the services either for passengers, cargo or combined passengers – cargo transport are to be offered in a hyperloop network.

5.2 Passenger transport

The passenger transport system defines the goals and objectives for the system through the range of services offered to its users:

- Fast travels enabled by speed exceeding high-speed transport modes (see Annex A);
- Controlled closed environment;
- Continuous operations not affected by weather and other external factors typically affecting operations of ground-based transport such as accidents, crossing traffic;
- Energy efficient travels with low direct greenhouse gas emission levels;
- Enable flexible scheduling based on the capacity required;
- High frequency of arrivals/departures;
- Seamless interfaces with other transport networks for door-to door travel through integration with inter-modal physical and digital Mobility as a Service (MaaS) infrastructure;
- Accessibility to person with disability and person with reduced mobility by enabling them to embark, disembark and occupy their place in the vehicle without assistance.

prEN 17929:2022 (E)**5.3 Cargo transport**

The cargo transport system defines the goals and objectives for the system through the range of services offered to its users:

- Controlled closed environment;
- Continuous operations not affected by weather and other external factors typically affecting operations of ground-based transport such as accidents, crossing traffic;
- Enable flexible scheduling based on the capacity required;
- Transportation of standardized, and configurable shipment units;
- Short transit times enabling up to same-day delivery within hyperloop;
- Seamless interfaces with other transport networks and last/first mile services;
- Fully traceable shipment;
- Infrastructure enabling easy integration into production, distribution and demand centres;
- Energy efficient travels with low direct greenhouse gas emission levels;

6 System boundaries and interfaces

The hyperloop system and its environment consists of a wide range of systems, entities, organizations, each with their own set of services. Subsequently each system / entity / organization within the hyperloop environment can have an array of system that themselves offer a set of services depending on their functionality.

The boundary of the system in this standard is defined by the hyperloop systems (infrastructure, vehicles and operating system) providing the hyperloop transport services.

Key enabling systems for hyperloop are energy infrastructure and communication systems infrastructure. The service characteristics of these systems such as power supply services, communications service for voice and data transmission, etc are well defined in their corresponding standards. As such they are not to be defined in this standard.

In this standard only a set of services specific to the hyperloop system focusing on technical design development are to be defined. The following hyperloop features define the basis of the service design of the hyperloop:

- The hyperloop is a primarily public mode of transportation, private applications are not excluded;
- The hyperloop is capable of very high-speed transport;
- The hyperloop vehicles operate in a closed environment;
- The hyperloop vehicles operate in a low pressure environment;
- The hyperloop is scalable in capacity for passenger transport and cargo operations;

The auxiliary services provided at the hyperloop station such as for example leisure and retail are out of scope of this standard.

7 System Stakeholders

7.1 General

Hyperloop system involves a number of internal and external stakeholders that are either directly participating in the development of the system, its operations and/or maintenance as well as in the development of related services. A whole range on stakeholders categories will develop with the system development in parallel. For the purpose of this standard only the main generic categories are listed below:

- Hyperloop Developers

Organizations developing hyperloop systems

- Infrastructure - related entities

Are responsible for development and / or maintenance of the transport infrastructure.

- Enabling systems service providers
- Communication infrastructure and services – for example in-vehicle infotainment, entertainment, applicability of vehicle to vehicle communications;
- Energy infrastructure;
- Traffic control and management;
- Mobility service providers that provides consumers with enhanced mobility through services and information throughout the travel chain by combining the services of several inter-modal transport companies as well as other service providers such as mobile, navigation, booking and financial service providers
- large set of existing technical processes, methods and tools such as failure description and definitions, risks, anomalies reduction, that are proven and being used by different technologies in a specific specialized domain or in several domains can be used in hyperloop system as well;
- Suppliers of various parts of the hyperloop systems
- Vehicle manufacturers
- Infrastructure providers/manufacturers
- Suppliers of products that already have wide acceptance within their sectors and tailor those as needed to hyperloop system parts;
- Operators

Inclusion of the operational know-how (e.g. railway operators) and future perspectives for utilization and integration of transport modes are important in the design of hyperloop services especially in terms of interoperability, compatibility and safety;

- Governments
- Governments local/regional/national and other public authorities are that are responsible for planning and very often funding the transport infrastructure.

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- Legislative authorities
- Public authorities such as Ministries of Transportation, Economic Development and Innovation that unlock public funding, develop standards-receptive legislation, issue standardization mandates (e.g. through EU Committee on Standards Regulation (EU) 1025/2012) and public procurement, help induce public acceptance of the hyperloop systems and communicate with the EU bodies and provide the approval process and authority
- Independent research bodies (e.g. research institutes, universities)
- Define and validate novel systems unique to the hyperloop, aid in the test planning according to the standards;
- Certification / inspection bodies
- Validate testing results and certify interfaces, parts and processes for commercial use;
- Users

Hyperloop passengers and/or their respective associations and logistic operators/ cargo carriers:

- Passengers are travellers who utilize hyperloop as transport means in order to get from origin to destination. Passengers can furthermore be divided into other categories such as commuters, and non-commuters.
- Logistic operators / cargo carriers are organizations which transport goods between locations and use a hyperloop system as the means of transportation.

7.2 Hyperloop Transport System Users

7.2.1 General

Hyperloop transport system involves a number of internal and external stakeholders with whom it interacts during or as a result of its operations. This set of stakeholders is a subset of the system stakeholders.

For the purpose of this standard in order to identify the user expectations this subset is grouped in the category of hyperloop system users. The system users are divided into:

- Passenger transport users
- Cargo transport users

7.2.2 Passenger Transport System Users

Passenger transport system users are:

- Travellers are the end users of the system benefitting from its features.
- Transport operators (that run transportation system on a day-to-day basis) providing transport services.
- Infrastructure related entities and internal users are responsible for development as well as maintenance of the transport infrastructure.
- Services providers that offer enhanced mobility as a service.