TECHNICAL SPECIFICATION

ISO/TS 17263

First edition
2003-06-01

Automatic vehicle and equipment identification — Intermodal goods transport — System parameters

Identification automatique des véhicules et des équipements — Transport intermodal de marchandises — Paramètres des systèmes

© ISO 2003

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 17263 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 204, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European pre-Standard..." to mean "...this Technical Specification...".

Contents

Foreword

This Technical Specification (CEN ISO/TS 17263:2003) has been prepared by Technical Committee CEN/TC 278, "Road Transport and Traffic Telematics", the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 204, "Intelligent transport systems".

This is the third part of a series of Technical Specifications defining Intermodal Goods Transport for AVI/AEI, and is the result from CEN/TC 278 Work Item 00278089. The following documents are published to form a series of standards for for AVI/AEI in intermodal goods transport AVI/AEI:

— CEN ISO/TS 17261   Architecture and terminology (under preparation)

— CEN ISO/TS 17262   Numbering and data structures

— CEN ISO/TS 17263   System parameters

— CEN ISO/TS 17264   AVI/AEI interfaces (under preparation)

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This Technical Specification specifies parameters for a system for the automatic identification of equipment, vehicles and items (AEI) used in intermodal transport chains. This Technical Specification is designed to enable users and suppliers of AEI-Systems to specify or use a system or components of a system that will enable interoperability. Such systems are designed to read and transfer the identity and some further important data of equipment, vehicles and items used in intermodal transport to other partners in each possible transport chain to minimise the expenditure and to automate the process of transport observation and control. This pre standard is a part of a family of Standards for that purpose.

AEI systems are necessary as a basic tool for RTTT/TICS applications in intermodal transport operation. These information systems need real-time highly reliable data about the identity, status, time, location, etc. of the equipment, vehicles or items during the transport operation. The characteristics of an Intermodal Transport chain is that pieces of equipment or items will be loaded or unloaded more than once from *other* pieces of equipment or vehicles. AEI systems in such applications shall also be able to provide the identity of both units at the loading and unloading process. The purpose is to capture the event so that the information system reflects the real world.

1 Scope

1.1 General

This Technical Specification establishes an AEI-System based on radio frequency technologies. This system is intended for general application in RTTT/TICS. It allows the transfer of the identification codes and further information about equipment and vehicles used in intermodal transport into such RTTT/TICS and information systems related to Intermodal Transport processes. Within the intermodal context of the RTTT/TICS Sector, AEI systems have the specific objective of achieving an unambiguous identification of an ITU or related equipment or vehicle or item used in intermodal transport, and to make that identification automatically. Vehicles will be considered and handled under Intermodal aspects as „Intermodal Equipment". Therefore a differentiation between AEI and AVI systems under the purpose of this standard is not required.

This Technical Specification is specifically aimed at DSRC-type air interfaces. The requirement and test methods may not apply for Intermodal AEI systems using long range communications such as Cellular Networks or Satellite, or vicinity communication such as inductively coupled antennas. The interoperability across the air interface (reference point Delta) is outside the scope of this Technical Specification. Please see CEN ISO/TS 17264 *Automatic Vehicle and Equipment Identification (AVI/AEI) - AVI/AEI Interfaces* (under preparation).

1.2 Aim

The aim of this standard is to define, describe and specify the System Parameters related to an intermodal AEI system to provide an enabling Standard, which, whilst allowing the system specifier to determine the performance levels and operating conditions, provides a framework for interoperability. Therefore this Technical Specification specifies:

a) parameters and requirements of the identification system itself

b) performance criteria necessary to ensure consistent and reliable operation of AEI systems within international transport processing

c) requirements of the performance and the position of the electronic devices (tag) when installed on intermodal equipment

d) requirements for the installation of readers, and performance data related to these components.

NOTE: These parameters of an AEI system shall be identical, compatible or interoperable world-wide in respect of systems complying to this Pre-Standard. Yet it is recognised that, at the implementation level, there may be requirements for regional or operational differences in the performance levels achieved against these parameters.

1.3 Pre-requisite

Any system to read identity and related data has to be based on a standardised system to allocate an unambiguous identity to each item, vehicle, load unit or equipment as defined in CEN ISO/TS 17262 *Automatic vehicle and equipment identification - Intermodal goods transport - Numbering and data structures.*

2 Normative references

This Technical Specification incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Technical Specification only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13044, Swap Bodies - Coding, Identification and Marking

ISO 10374, Freight containers – Automatic identification

ISO/IEC 8824-1, Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 1: Specification of the Basic Notation

ISO/IEC 8824-2, Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 2: Information Object Specification

ISO/IEC 8824-3, Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 3: Constraint Specification

ISO/IEC 8824-4, Information processing systems - Open Systems Interconnection - Specification of abstract syntax notation one (ASN.1) - Part 4: Parameterisation of the ASN.1 Specifications

ISO/IEC 8825-1, Information processing systems - Open Systems Interconnection - Specification of ASN.1 Encoding Rules – Part 1: Basic Encoding Rules

ISO/IEC 8825-2, Information processing systems - Open Systems Interconnection - Specification of ASN.1 Encoding Rules – Part 2: Packed Encoding Rules

ISO/IEC 8825-3, Information processing systems - Open Systems Interconnection - Specification of ASN.1 Encoding Rules – Part 3: Distinguished Encoding Rules

ENV ISO 14815, Road Traffic and Transport Telematics - Automatic Vehicle and Equipment Identification – System specification

CEN ISO/TS 17261: Road Transport and Traffic Telematics - Automatic vehicle and equipment identification - Intermodal goods transport - Architecture and terminology

CEN ISO/TS 17262: Road Transport and Traffic Telematics – Automatic vehicle and equipment identification - Intermodal goods transport - Numbering and data structures

CEN ISO/TS 17264: Road Transport and Traffic Telematics - Automatic Vehicle and Equipment Identification (AVI/AEI) - AVI/AEI Interfaces

3   Terms and definitions

For the purposes of this Technical Specification, the following terms and definitions apply:

3.1
AEI Reader
complete equipment even if it consist of more than one components required to interrogate, receive and interpret the data in the tag in order to present the identification.

3.2
AEI System
AEI application in a RTTT/TICS system either as a stand-alone system or as part of a RTTT/TICS application.

3.3
category
grouping of common class requirements to support interoperability between AEI systems of common purpose

EXAMPLE: a "Ruggedised" category versus a "Standard" category.

3.4
class
term used to differentiate between system components with different "grades" of requirements for parameters.

3.5
intermodal Transport
movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves when changing modes.

3.6
interoperability
stands for „ Application Area Interoperability" in a region spanning two or more areas with cross-border operation between operator domains, districts or nations. The capability for an AEI Reader to operate with a AEI System tag.

3.7
load unit
containers, swap bodies and semi-trailers suitable for intermodal transport.

3.8
transport means
vehicle used for the transport of goods, e.g. vessel, train, truck.

3.9
operational parameter
term used to describe different operational component properties/specifications

3.10
shadowing
condition where the close proximity of a vehicle/equipment interposed between Reader and tag obscures the signals thus preventing a successful AEI transaction.

3.11
small container unit
Intermodal Transport Units which are smaller than a standard 20-foot-ISO-Standard container or CEN-swap body. Small containers are also called medium containers or "less than container" (LCU). The size of such LCU´s will be at least one ISO- or Euro- palette.

3.12
tag
equipment fitted to the unit, vehicle or item to be identified and containing the unambiguous identification, and if required some further data. For special purposes the tag can be installed in a fixed position with a mobile reader.

4 Symbols and abbreviated terms

The following abbreviations are used in this Technical Specification:

4.1
AEI
Automatic Equipment Identification

4.2
ASN.1
Abstract Syntax Notation number One

4.3
DSRC
Dedicated Short Range Communication

4.4
ITU
Intermodal Transport Unit

4.5
LCU
Small container ("Less than Container Unit:")

4.6
RTTT
Road Transport and Traffic Telematics (CEN TC278)

4.7
TICS
Transport Information and Control Systems (ISO TC204)

5 System architecture and specification

5.1 Generic specification

This Technical Specification is designed to enable users and suppliers of AEI systems to define a system specification including system requirements to enable international interoperability based on harmonised DSRC links.

NOTE: The interoperability across the air interface (reference point Delta) is outside the scope of prCEN ISO/TS 17263. Please see prCEN ISO/TS 17264.

The term „AEI" is used both to describe „independently functioning AEI systems" and as „the function of identification within other RTTT/TICS applications". Both such uses are supported by this Technical Specification where no other application or sector standard applies.

The Generic System specification for AEI Systems in the Intermodal Transport world in terms of functions supported, the interface requirements, the structure of the information and data related to system components and the data exchange shall be in accordance to the specification described in the following standards:

— prCEN ISO/TS 17261   Architecture and terminology

— prCEN ISO/TS 17262   Numbering and data structures

— prCEN ISO/TS 17264   AVI/AEI interfaces

in order to guarantee the interoperability of equipment, vehicles or items used at the same time in regular and in intermodal environment.

5.2 Architecture and data structure of elements

Figure 1, taken from prEN ISO 14814[1] provides a schematic summary of the conceptual architecture.
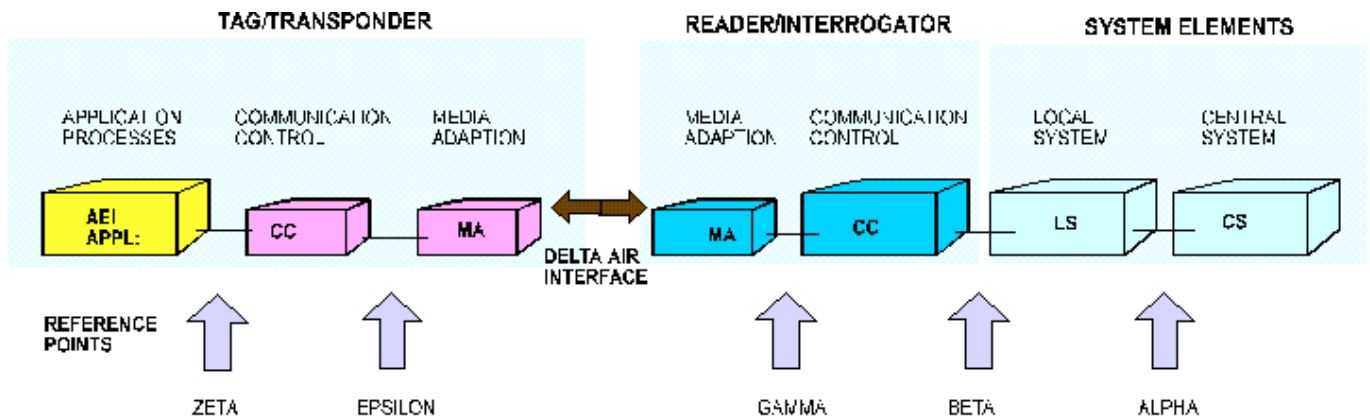

Figure 1 — Overall Conceptual Reference Architecture Model of an AEI System

For the data structure elements, Abstract Syntax Notation One (ASN.1) Packed Encoding Rules (PER) are used (see ISO/IEC 8824 and ISOIEC 8825).

For further detailed information concerning:

— Conceptual Architecture,

— Logical Architecture,

— Functional Architecture,

— Control Architecture,

— Identification principles,

— Information Architecture,

— Physical (application) Architecture

see prCEN ISO/TS 17261 and CEN ISO/TS 17262.

6 Requirements and parameters

6.1 Basic rules

6.1.1 Purpose

The purpose of the use of AEI systems in Intermodal Transport is the identification of vehicles, equipment and items on several appropriate points in an Intermodal Transport chain for several applications. Such applications can be:

— fleet management,

— yard management, (i.e. entry/exit control, handheld reading etc)

— transport observation and

---

[1] In preparation

— check an assign procedure of an ITU to a vehicle (terminal operation)

— etc.

The functional and technical condition of the information exchange is to be specified in further application specific standards.

6.1.2 Data capture system categories

AEI systems shall be able to deliver at least the unique identification of the equipment, item or vehicle at different points in a transport chain, under different weather conditions and under different operational conditions.

Optionally, additional information (e.g. direction of the movement; basic data about the objects; and location at the moment of identification) may be supported. For different purposes this standard defines the following data capture system categories:

a) Fixed Point Data Capture System (e.g. access control at terminals)

b) Lane Data Capture System (identification on highway or railway)

c) Yard Control and Handling System (Usually movable readers equipment)

d) Portable Data Capture System (Short distance Reading System, i.e. handheld readers)

Whilst a) and b) are fixed installations, the installations in c) and d) are usually mobile installations that may be fixed on a vehicle, crane or other equipment.

6.1.3 User requirements; technical and electronic features

In order to ease the commissioning procedure, the parameters are split into easily testable requirements. The aim of this standard is to define only the most relevant parameters necessary to guarantee system interoperability and overall system operation.

Clause 6 contains the system requirements and parameters specified by the system operator.

In 7 a set of electronic parameters and requirements is presented to enable test methods for the system suppliers.

NOTE 1: If parts of the equipment are exclusively operated under narrow specified environmental conditions, different „operational classes„ can be defined to avoid unacceptably high test-costs. A system specifier will then be able to specify the appropriate performance and design parameters to meet its own particular requirements. Such special environmental requirements will not be a part of the standard.

NOTE 2: Shadowing caused by normal traffic flow on roads or terminal gates has to be taken into account and overcome to provide a successful transaction. Abnormal shadowing may be caused by too many different objects stacked too closely.

For systematic reasons, the user requirements will be split into:

— **System requirements**
All requirements coming from the practical deployment of the system and related to the system itself and its performance.

— **tag requirements**
All performance and technical requirements concerning the Tag.

— **Reader requirements**
The necessary characteristics for performance and proper operation of the reader.

6.2 System operational parameters and requirements

6.2.1 Basic requirements and performance criteria

An AEI system shall be able to read the tag affixed to different types of intermodal equipment automatically and with or without any pre information and in any order. This Technical Specification is related to the following groups:

— Vehicles such as lorries, tractors, straddle carriers, fork lifts, trailers and semi-trailer

— Standard or non standard boxes as i.e. swap bodies, ISO and domestic containers

— Small boxes as i.e. logistic boxes and packages

— Transport supporting means as i.e. load beds, spreaders and other handling devices

The nominal reading process shall be carried out from the length side seen from the direction of the movement of any kind of equipment or item. This means perpendicular to the normal movement direction of the object which has to be identified.

The system shall be able to identify several (see table 1) different objects and assign these objects to a common set as e.g. a number of LCU´s plus intermediate frames, plus trailer, plus lorry forming an intermodal road train. How the linking of the readings is achieved is outside the scope of this Technical Specification.

In case where more than one lane is in use, the system shall be able to discriminate between lanes and direction. How this is achieved is outside the scope of this Technical Specification.

NOTE: The nominal situation is that an object will carry only one tag, and then there usually is a need for reading the object from both sides. In case the position of the object is guaranteed, the reading may alternatively be done from one side only.

6.2.2 Reliability and Security

Reliability relates to the error rate between reference points „alpha„ and „delta" determined in 5.2. There are two parameters; non-readings and incorrect readings.

The non reading rate: In order to guarantee the proper function of automatic data processing systems and/or RTTT/TICS a compliant AEI system shall be able to provide less than one non-read during 10.000 identification attempts. These results shall be reached under nominal operational conditions at reference point Beta, see 7.

The incorrect reading rate: A compliant AEI system shall deliver less than 1 undetected errors during 1.000.000 identifications. These results shall be reached under nominal operational conditions at reference point Beta, see 7.

Confidentiality is an optional requirement for an interoperable AEI system (or system service) as its principle objective is to positively identify vehicles/equipment. Refer to CEN ISO/TS 17262 for further details.

NOTE: In case of high security environments like border control, electronic sealing etc. authentication and other security services like certification and non-repudiation may be inside the scope of the identification. The means of providing these security services are outside the scope of this Technical Specification.

6.3 Specific parameters and performance criteria for the reader

6.3.1 General

Readers will be normally used in relative closed areas. This could lead to varied environmental conditions.

Specific environmental related requirements for specific use are a matter of agreements between supplier and system operator. This is outside the scope of this standard

6.3.2 Application related performance criteria

The reader of an AEI-System shall meet at least the requirements defined in table 1.

Table 1 — Performance criteria

Application Categories	Reading Distance	Tag separation in reading zone	Allowed tag versus Reader orientation (Figure 2)	Passing Speed
Fixed point data capture system	0,5 m - 5,0 m	0,10 m distance between tags in any direction	in a conical area within an angle (γ) of 20° from the reader centre axis and from the tag centre axis within an angel (β) of 20°	0,0 to 36,0 km/h
Lane data capture system	1,0 m - 10,0 m	0,10 m distance between tags in any direction	in a conical area within an angle (γ) of 25° from the reader centre axis and from the tag centre axis within an angel (β) of 25°	0,0 to 160,0 km/h
Yard control and Handling systems	0,5 m - 5,0 m	0,10 m distance between tags in any direction	in a conical area within an angle (γ) of 30° from the reader centre axis and from the tag centre axis within an angel (β) of 30°	0,0 to 36,0 km/h
Portable data capture system	0,05 m - 0,5 m	No specific	no specific	0,0 to 3,6 km/h

6.3.3 Protection and safety

The reading system shall be designed in such a way that the environment will not be disturbed by the system (i.e. by electromagnetic interference), nor should operational environmental conditions disturb or damage the system (i.e. by electromagnetic interference, mechanical shocks, vibration etc.).The allowed orientation of the tag versus the reader is shown in figure 2. Please see ENV ISO 14815 for environmental requirements and qualification procedures.
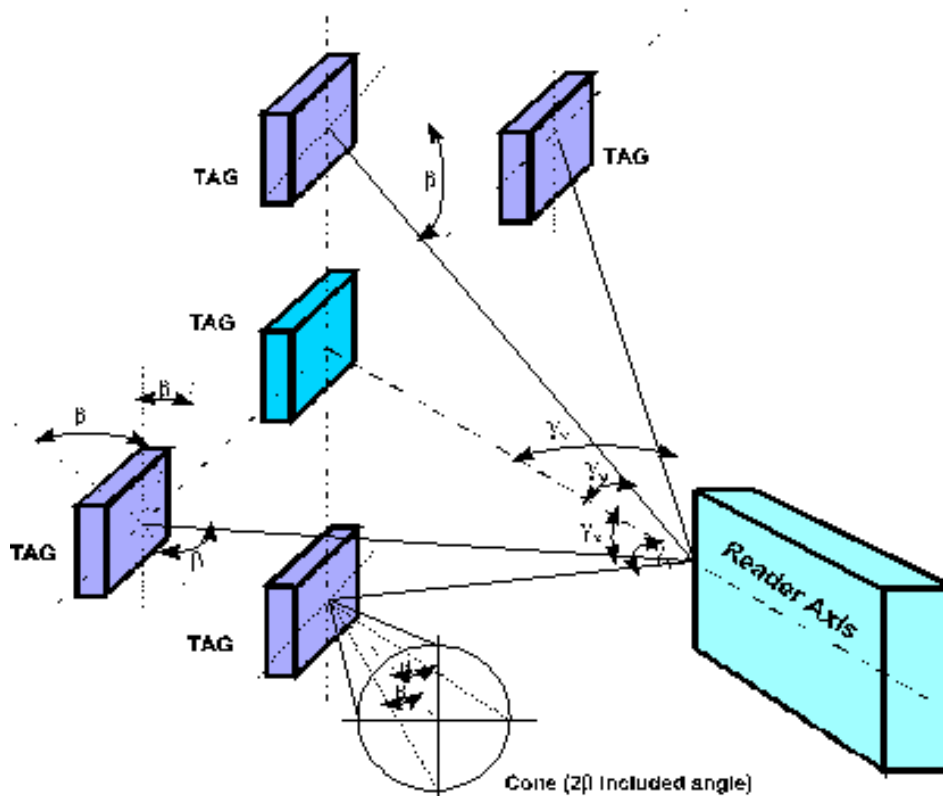

Figure 2 — Allowed tag versus reader orientation

NOTE: tags may be presented in different orientations

6.4 Specific operational parameters and performance criteria for tag

6.4.1 Data contents and storage capacity

Each tag shall be able to store mandatory and optional data as specified in CEN ISO/TS 17262.

The tag may have R/W or R/O storage capacity in addition to identification.

NOTE: tags may additionally be used for monitor purpose as i.e. temperature or pressure control inside of load units. The structure of these data must be agreed between suppliers, system operators and system clients.

6.4.2 Mounting conditions

AEI-systems in Intermodal Transport operation are designed to read tag mounted on one of the two length sides of the object (seen from the normal direction of the movement), which should be identified.

For the most important standardised ITU in Intermodal Transport the existing standards shall be taken into account, which already describe concrete rules to fix the tag. This means the installation of tag on ISO containers shall be carried out as described in ISO 10374. The installation of a tag on European swap bodies shall be in accordance with EN 13044.

For all other applications mounting area and location of the tag on the object depends from the character of object itself, which shall identified by the AEI-system.

If an object which has to be identified is equipped with upper corner fittings, the aim should be as far as possible to fix the tag in a window around these handling devices as shown in figure 3.
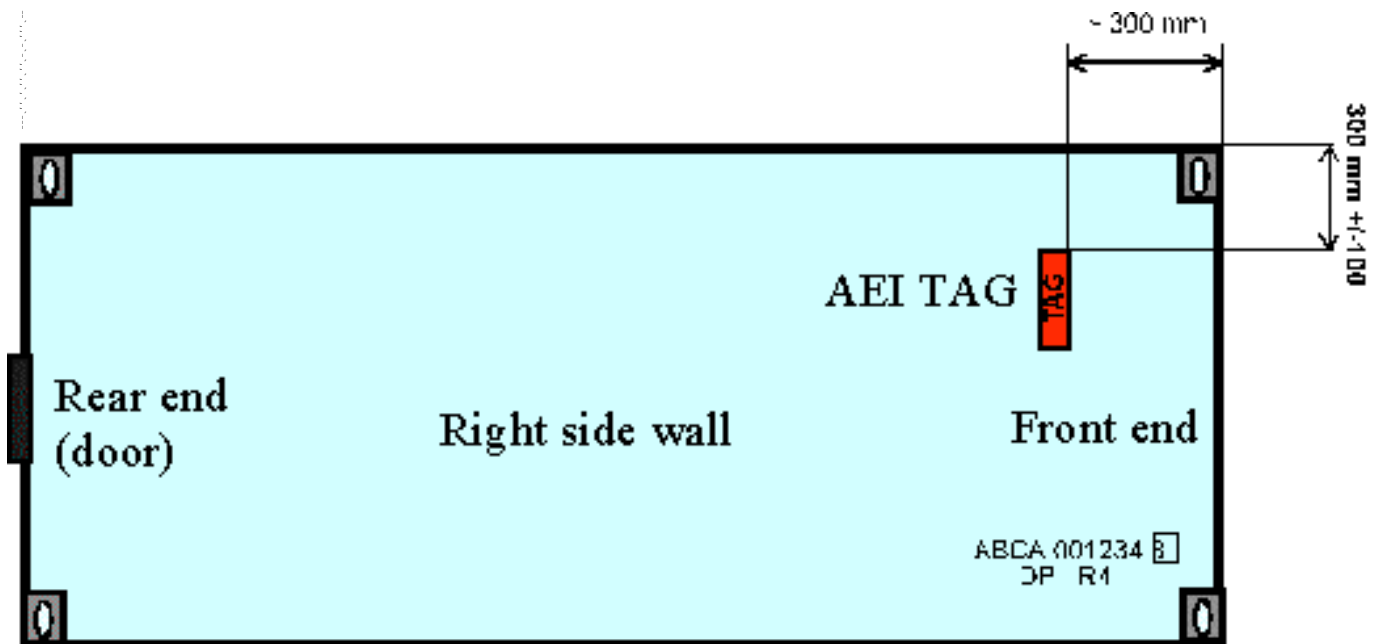

Figure 3 — Mounting window on Intermodal Transport units - ISO-Container

For those boxes where the tag position as defined in figure 3 is not possible, the aim should be to fix the tag in a window as shown in figure 4. This could be the case for any special containers or for a large number of swap body types.
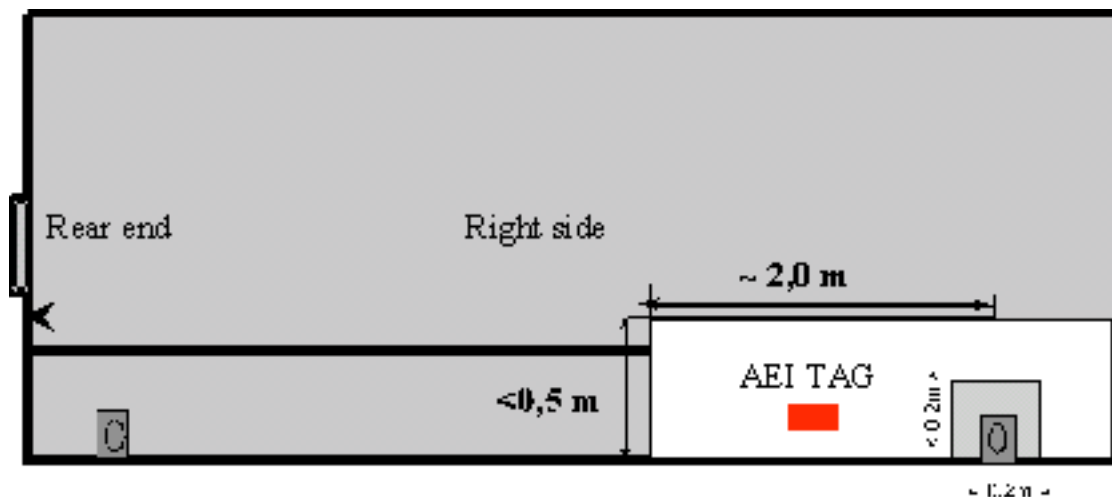
Figure 4 — Tag location area on intermodal transport units - swap body (white area)

For all types of vehicle or trailer to be identified in Intermodal Transport operation a similar tag location area as defined in figure 4 shall be defined, related to the centre of the first wheel (see figure 5).
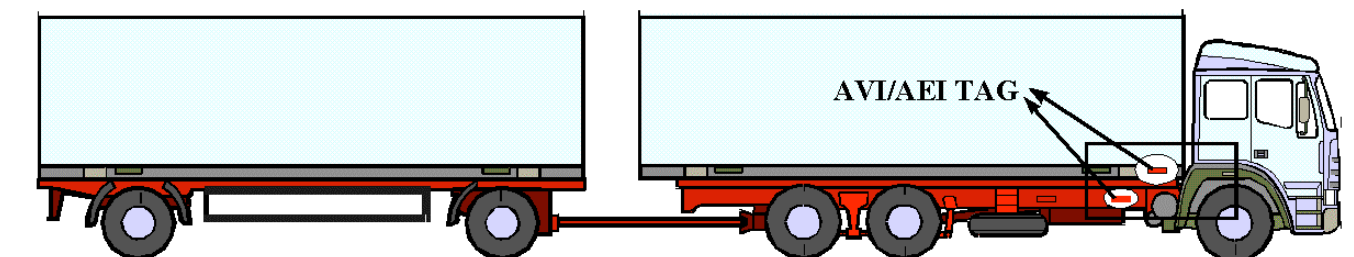

Figure 5 — Mounting window on vehicles (black frame)

Bibliography

ENV 12314-1:1996 Road Transport and Traffic Telematics - Automatic vehicle and equipment identification - Part 1: Reference architectures and terminology[2]

---

[2] To be replaced by EN ISO 14814, in preparation

ICS 03.220.20; 35.240.60

Price based on 11 pages