ENGLISH TRANSLATION

SPECIFIED LOW POWER RADIO STATION

433MHz-BAND DATA TRANSMISSION EQUIPMENT

FOR INTERNATIONAL LOGISTICS

ARIB STANDARD

ARIB STD-T92 Version 1. 0

Version 1.0 March 14th 2007

Association of Radio Industries and Businesses

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Foreword

The Association of Radio Industries and Businesses (ARIB) investigates and summarizes the basic technical requirements for various radio systems in the form of "ARIB Standards". These standards are developed with the participation of and through discussions amongst radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

ARIB Standards include "government technical regulations" (mandatory standard) that are set for the purpose of encouraging effective use of frequency and preventing interference with other spectrum users, and "private technical standards" (voluntary standards) that are defined in order to ensure compatibility and adequate quality of radio equipment and broadcasting equipment as well as to offer greater convenience to radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

This ARIB Standard is developed for SPECIFIED LOW POWER RADIO STATION 433MHz-BAND DATA TRANSMISSION EQUIPMENT FOR INTERNATIONAL LOGISTICS. In order to ensure fairness and transparency in the defining stage, the standard was set by consensus at the ARIB Standard Assembly with the participation of both domestic and foreign interested parties from radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

ARIB sincerely hopes that this ARIB Standard will be widely used by radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

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Contents

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Chapter 1 General descriptions

1.1 Outline

Among the radio equipment for specified low power radio station defined in the Article 6 of the Regulations for Enforcement of Radio Law (Notification 42 of the Ministry of Posts and Telecommunications, 1989, Revision by Notification 655 of the Ministry of Internal Affairs and Communications, 2006), this standard specifies on Data transmission equipment for international logistics that uses radio waves of the frequency more than 433.67 MHz and 434.17 MHz or less. This data transmission for international logistics refers to data transmission used for management control of a cargo for international transportation (specified in Article 49-14, Clause 3B of the Ordinance Regulating Radio Equipment Regulations) between Data transmission equipment for international logistics (specified in Article 49-14, Clause 3B of the same, hereinafter) and Data control equipment for international logistics (specified in Article 49-14, Clause 3B of the same, hereinafter), or between mutual data transmission of Data transmission equipment for international logistics.

1.2 Scope of the standard

A data transmission equipment for international logistics consists of a data control equipment for international logistics, and a data transmission equipment for international logistics. A data control equipment for international logistics consists of radio equipment (including an antenna, a transmitter, a receiver, and a radio controller), power supply equipment, and a controller (a data processing unit) as shown in Figure 1-1. A data transmission equipment for international logistics consists of radio equipment (including an antenna, a transmitter, a receiver, a radio controller, a power supply unit and a controller (a data processing unit)) as shown in Figure 1-2. However, a data transmission equipment for international logistics may not include a receiver depending on the use.

This standard specifies the technical requirements of radio equipment of a data control equipment for international logistics, and radio equipment of a data transmission equipment for international logistics.

While, communication protocols between a data control equipment for international logistics and a data transmission equipment for international logistics, as well as between a data transmission equipment for international logistics and a data transmission equipment for international logistics (regulations for interoperability) are not specified in this standard.

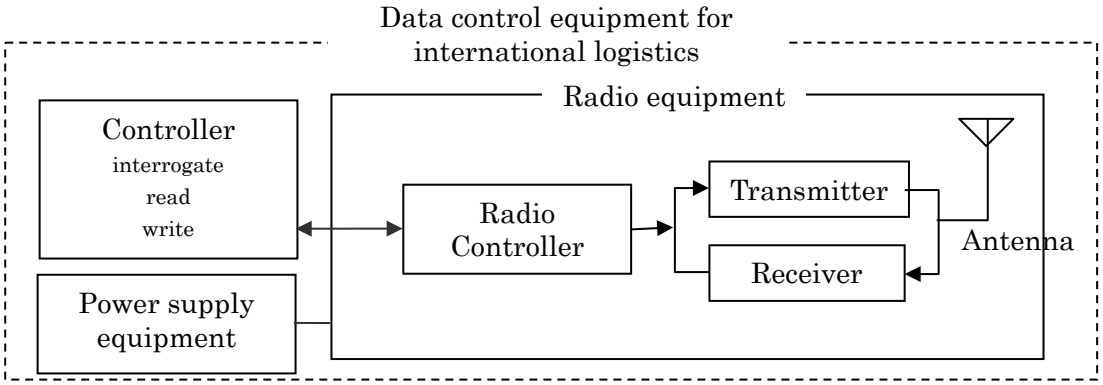

Figure 1-1 Configuration of Data control equipment for international logistics

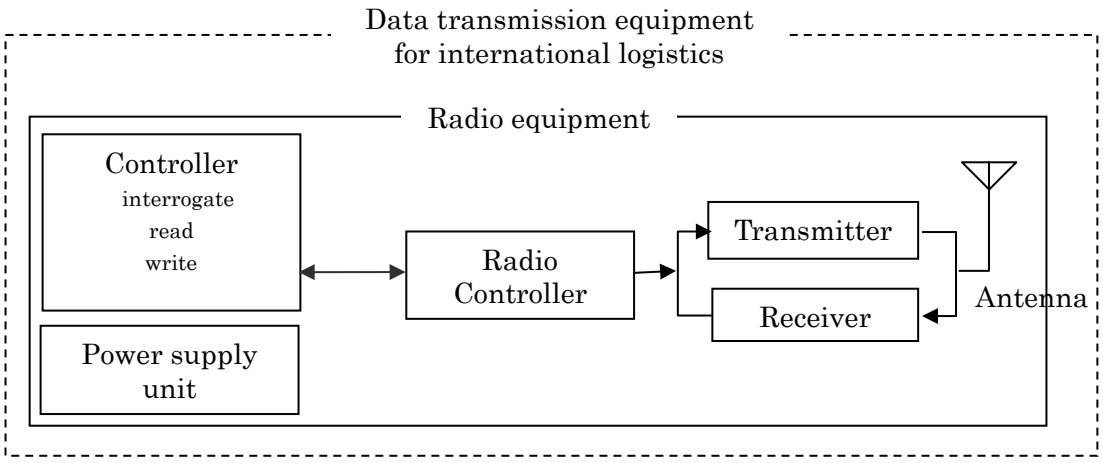

Figure 1-2 Configuration of Data transmission equipment for international logistics

1.3 Reference regulations

In this standard, "RL" refers to the Radio Law, "RERL" refers to the Regulations for Enforcement of the Radio Law, "ORE" refers to the Ordinance Regulating Radio Equipment, "OTRCC" refers to the Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment and "NT" refers to a Notification of the Ministry of Posts and Telecommunications before 2000 or a Notification of the Ministry of Internal Affairs and Communications after 2001.

Chapter 2 Overview of the standard system

2.1 Standard system

(1) Configuration of the standard system

Standard system consists of one data control equipment for international logistics (an interrogator) and a plurality of data transmission equipment for international logistics (active tags) as shown in Figure 2-1.

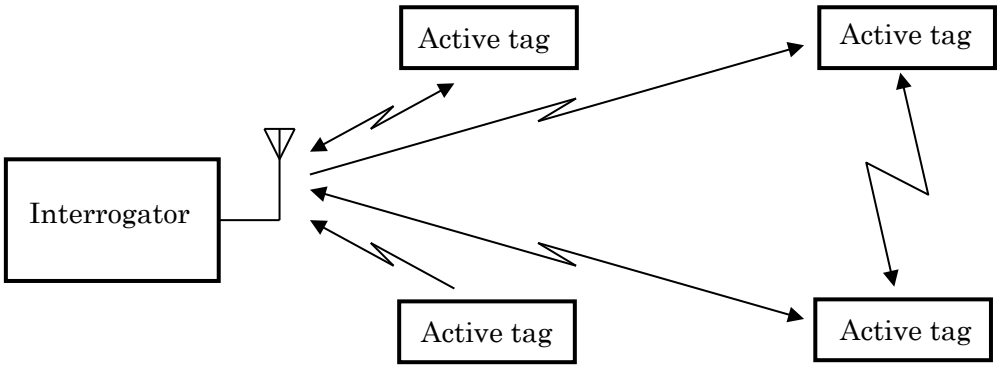

Figure 2-1 Configuration of the standard system

This system exchanges information through radio communication which is limited to data transmission provided for management operation of a cargo for international transportation, between an interrogator and active tags or between mutual active tags, in one-way or two-way.

A data control equipment for international logistics (an interrogator) is used mostly in a port, an airport, or a critical hub for other logistic network, and transmit information (data) concerning wakeup or sleep of a data transmission equipment for international logistics (an active tag) and, a cargo for international transportation. A data transmission equipment for international logistics (an active tag) transmits information (data) concerning a cargo for international transportation installed on the cargo for international transportation (including a cargo body, a container or palette, and other transportation material similar to these).

(2) Operation of the standard system

- Use scene of an active tag system

Use of an active tag system is now under consideration in various frequency bands. In particular, an active tag system which uses 433MHz-band frequency (referred to as "a 433MHz-band active tag system") is under consideration for utilization mostly in an international physical distribution.

A 433MHz-band active tag system has already been established as an international standard, and an air-interface is specified based on ISO/IEC 18000-7 in the standard of an electronic tag system.

In an international physical distribution using a container, an active tag which uses 433MHz-band frequency (referred to as "a 433MHz-band active tag ") may be attached to the wall surface or an opening and closing door of the container, or installed in the internal of the container, so that various information based on various types of operation conditions and forms will be written or recorded in the 433MHz-band active tag. An example of a 433MHz-band active tag installed on a container is illustrated in Figure 2-2.

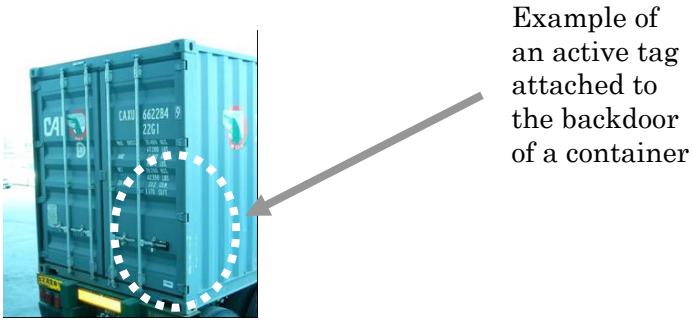

Figure 2-2 An example of a 433MHz-band active tag installed on a container

On the other hand, an interrogator which uses 433MHz-band frequency (referred to as "a 433MHz-band interrogator") may be fixedly installed on a gantry crane or a transfer crane which is installed on a container yard or a gate of the container yard in many cases.

Also, in a factory, a warehouse, or a distribution center, a transportable 433MHz-band interrogator is used for electronic locking of the container after vanning (loading of a cargo into a container), or an electronic unlocking before devanning (unloading of a cargo from a container).

An image of the use scene of a 433MHz-band active tag is illustrated in Figure 2-3. Also, an example of an interrogator installed on a gate is shown in Figure 2-4, and another example of an interrogator installed on a crane in a port is shown in Figure 2-5.

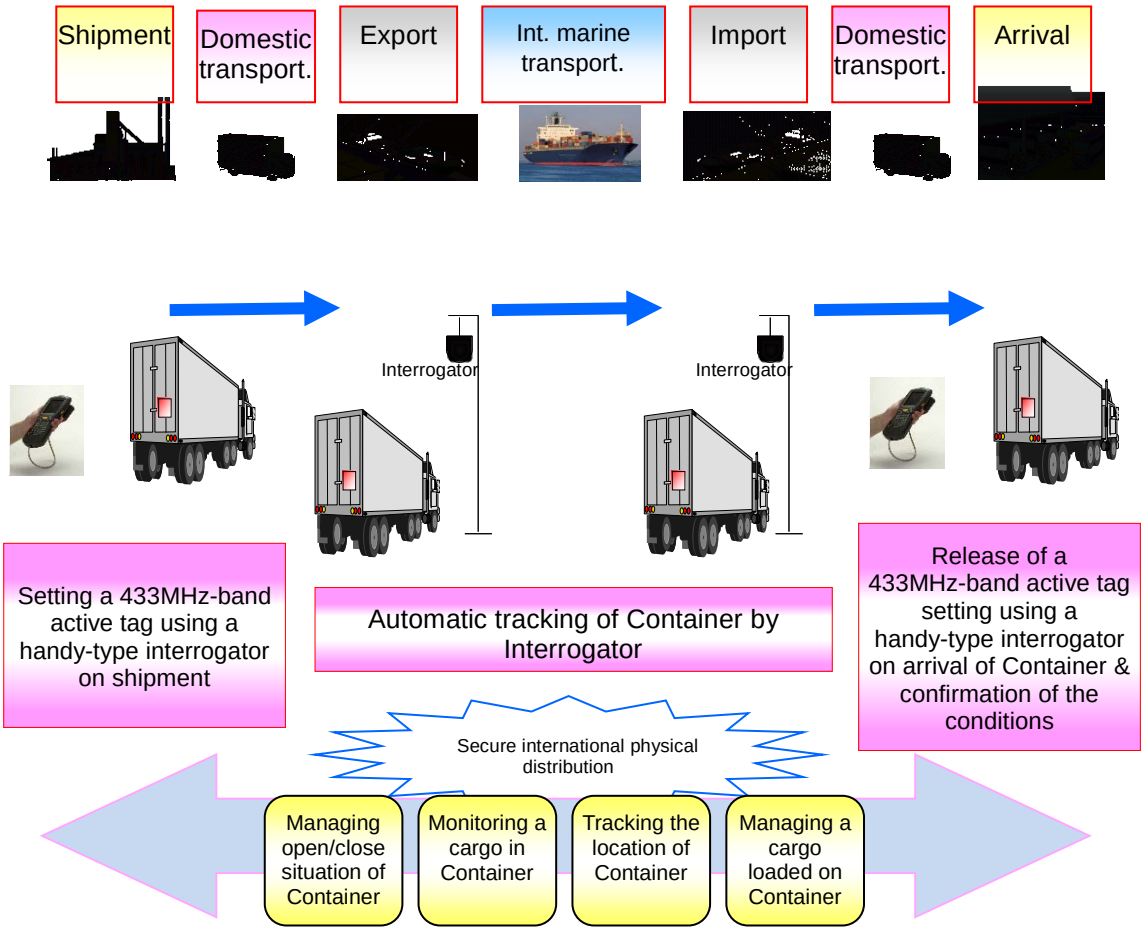

Figure 2-3 An image of the use scene of a 433MHz-band active tag system

Figure 2-4 An example of a 433MHz-band interrogator installed on a gate.

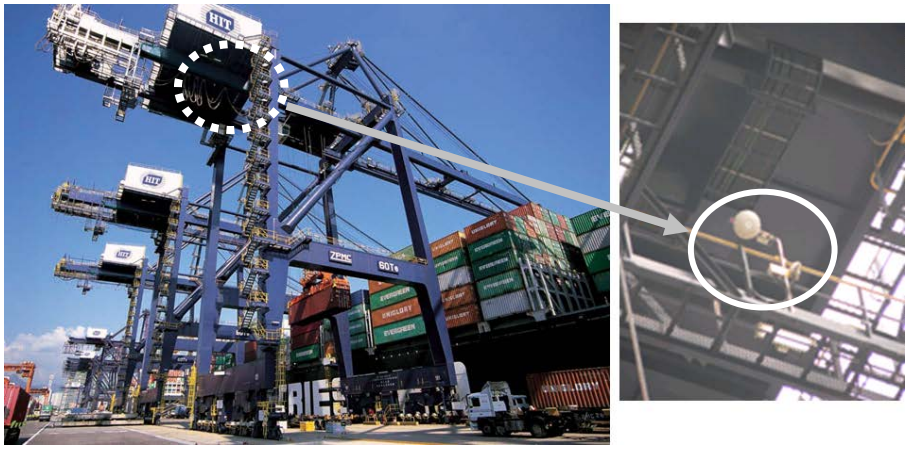

Figure 2-5　An example of a 433MHz-band interrogator installed on a crane at a harbor

As an operation mode of a 433MHz-band active tag, for the purpose of transit management of a container at a designated area for example, upon the translocation of the container by a crane, or of a container passing through a gate, there are two modes: an ID transmission mode activated by a 433MHz-band interrogator, and an ID transmission mode without the activation by an interrogator that transmits an alarm when an unusual opening or closing of a door is detected. In addition, for an expensive cargo, there is an ID transmission mode operating at a constant interval for confirmation of the presence of that.

A cargo is transported from a shipment place to an arrival place as shown in Figure 2-3. Upon shipment, cargo information, sealing information and the like are written into a 433MHz-band active tag. Also, an ID shall be then transmitted to be the shipment information. A 433MHz-band active tag is activated by a 433MHz-band interrogator to transmit the ID for keeping a transit record through a distribution center or a harbor. Such a transit management is performed at the checkpoints on transportation in each time. Finally, at the arrival place, it is verified from the sealing information whether a person having a autority for opening the cargo has performed regularly, and at the same time processing of arrival of a cargo and/or goods is performed. Such electronic sealing or release of an electronic locking may use a 433MHz-band transportable interrogator as shown in Figure 2-6.

Figure 2-6　A use scene of a 433MHz-band transportable interrogator at a storehouse

2.2 Key parameters and functionality of the standard system

Key parameters and functionality of the standard system are shown in Table 2-1.

Table 2-1 Key parameters and functionality of the standard system

Items		Data control equipment for international logistics (Interrogator)	Data transmission equipment for international logistics (Active tag)
Frequency (Designated Frequency band)		433.92 MHz (more than 433.67 MHz and 434.17 MHz or less)	
Permissible value of Occupied bandwidth		500kHz or less	200kHz or less
Antenna power (Value of Equivalent Isotropically Radiated Power)		In case signal transmission for startup : 0.1 mW or less Other than the stated above : 0.4mW or less	1mW or less
Communication method		Simplex method, One-way method, Broadcast method	
Trans-mission time restriction	Trans-mission time	In case signal transmission for startup : To cease emission within 2.7 seconds, and within 1440 seconds per hour Other than the stated above : To cease emission within 1 second, and within 360 seconds per hour	To cease emission within 1 second, and within 360 seconds per hour
	Cessation time	1 ms or more	

Chapter 3 Technical requirements for radio equipment

3.1 General conditions

(1) Communication method

Simplex method, one-way method, broadcast method

(RERL : article 6, NT: No.42, 1989)

(Revised NT: No.655, 2006)

(2) Contents of communications

Data signal

(3) Emission class

Not specified.

(4) Operating frequency band

433.92 MHz (more than 433.67 MHz and 434.17 MHz or less)

(NT: No.433, 2006)

(Revised NT: No.658, 2006)

(5) Usage environment condition

Not specified.

3.2 Transmitter

(1) Antenna power

It shall be less than 1 mW for Data transmission equipment for international logistics.

It shall be less than 0.4 mW for a data control equipment for international logistics. However, in case transmitting a signal for startup of a data transmission equipment for international logistics, it shall be 0.1 mW or less.

It is noted that the antenna power is a value of Equivalent Isotropically Radiated Power.

(RERL: article 6, NT: No.42, 1989)

(Revised NT: No.655, 2006)

(2) Tolerance for Antenna power

Upper limit tolerance: +20%

Lower limit tolerance: Not specified.

(ORE: article 14)

(Revised Ministerial ordinance of MIC No.145, 2006)

(3) Tolerance for operating frequency

Not specified due to being the frequency band shown in Table 3-1.

Table 3-1 Designated Frequency band

Frequency	Designated Frequency band
433.92 MHz	more than 433.67 MHz and 434.17 MHz or less

(ORE: article 5)

(ORE: attached table No.1)

(Revised 2006 Ministerial ordinance of MIC No.145)

(NT: No. 433, 2006)

(Revised NT: No. 658, 2006)

(4) Modulation method

Not specified.

(5) Permissible values for occupied bandwidth (including frequency deviation)

It shall be 200 kHz or less for data transmission equipment for international logistics.

It shall be 500 kHz or less for a data control equipment for international logistics.

(ORE: article 6, NT: No. 659, 2006)

(6) Permissible values for Spurious emission/Unwanted emission intensity

Permissible values for Spurious emission/Unwanted emission intensity at an antenna input shall be the value in Table 3-5. It is noted that Permissible values for Spurious emission/Unwanted emission intensity shall be a value of Equivalent Isotropically Radiated Power.

Table 3-2 Permissible Values for Spurious Emission/Unwanted Emission Intensity

(Antenna input)

Frequency band	Permissible Values for Spurious Emission/Unwanted Emission Intensity	Reference bandwidth
1 GHz or less (excluding more than 433.67 MHz and 434.17 MHz or less)	250nW or less	100kHz
more than 1 GHz	1 μ W or les	1MHz

(ORE: article 7)

(ORE: attached table No.3)

(Revised Ministerial ordinance of MIC No.145, 2006)

3.3 Receiver

(1) Limit on Secondary Radiated Emissions, etc.

Limit on Secondary Radiated Emissions, etc. shall be value in Table 3-3, provided that it shall be a value of Equivalent Isotropically Radiated Power.

Table 3-3 Limit on Secondary Radiated Emissions, etc.

Frequency band	Limit on Secondary Radiated Emissions	Reference bandwidth
1 GHz or less	4nW or less	100kHz
more than 1 GHz	4nW or less	1MHz

(ORE: article 24)

(Revised Ministerial ordinance of MIC No.145, 2006)

3.4 Radio Controller

Radio Controller shall have following equipment and functions that comply with the conditions specified in the section described below.

(1) Interference preventing functions

Radio Controller shall transmit or receive an identification code automatically.

(ORE: article 9-4)

(Revised Ministerial ordinance of MIC No.145, 2006)

(2) Transmission time controller

The controller shall cease emission of radio waves within 1 second after starting of emission. It shall pause emission for 1 ms or more until the next emission. It is noted that cumulation of transmission time per hour shall be 360 seconds or less.

However, in a data control equipment for international logistics, if a signal is transmitted for startup of the data transmission equipment for international logistics, the controller shall cease emission of radio waves within 2.7 ms after the starting of emission. It shall pause emission for 1 ms or more until the next emission. It is noted that cumulation of transmission time per hour shall be 1440 seconds or less.

(ORE: article 49, NT: No. 49, 1989)

(Revised NT: No. 656, 2006)

3.5 Antenna

(1) Antenna

Not specified.

(2) Others

It shall not have a feeder and an earthing device.

(ORE: article 49-14)

(Revised Ministerial ordinance of MIC No.145, 2006)

3.6 Interface with Controller

Interface with a controller (a data processing unit) is not specified.

3.7 Cabinet

(1) Structure

A data transmission equipment for international logistics and a data control equipment for international logistics shall be contained in one cabinet respectively, and shall be structured not to be opened easily. This requirement, however, does not apply to the power supply equipment and the controller of the data control equipment for international logistics.

(ORE: article 49-14)

(Revised Ministerial ordinance of MIC No.145, 2006)

(2) Indication

An indication shall be posted onto the easy to see location of a cabinet that indicates that this radio equipment is permitted to emit radio waves only for international logistics use.

(ORE: article 49-14)

(Revised Ministerial ordinance of MIC No.145, 2006)

(ORE: article 49-14, NT: No. 657, 2006)

It is noted that in this regulation the following conditions of a) through e) shall be all satisfied:

a) An indication is posted onto an easy to see location upon installation. Marking shall be made by a robust manner such as the followings and not to be easily damaged or separated:

・engraving a cabinet;

・applying to a cabinet a metal plate, a polyester film or a polycarbonate on which the indication is printed with laminating;

b) Font size shall be 8 points or more, with color, font and the like easily identified.

c) The indication shall be presented by Japanese or English;

d) If the indication is in Japanese, it shall be either of the followings:

・"国際輸送用です";

・"国際輸送用途に限る.";

e) If the indication is in English, it shall be either of the followings:

・International Logistics Only;

・Limited for International Logistics use.

Chapter 4 Measurement methods

Method of measurement of this system shall follow "TELEC-T243: Method of measurement for Radio equipment used for Specified Low Power Radio Station Data Transmission for international logistics", which was registered to the Minister for Internal Affairs and Communications and published by Telecom Engineering Center (TELEC) Foundation, based on a Notification of the Ministry of Internal Affairs and Communications No.88-2. It is noted that for other test item which is not specified as test item in the above document, general method of measurement shall be applied.

If any revision is made to the measurements method according to such as NT, it shall be effective in accordance with its procedures.

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Page / Section	(Please describe your proposal or present your questions or comments in concrete terms.)	

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FOR INTERNATIONAL LOGISTICS

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