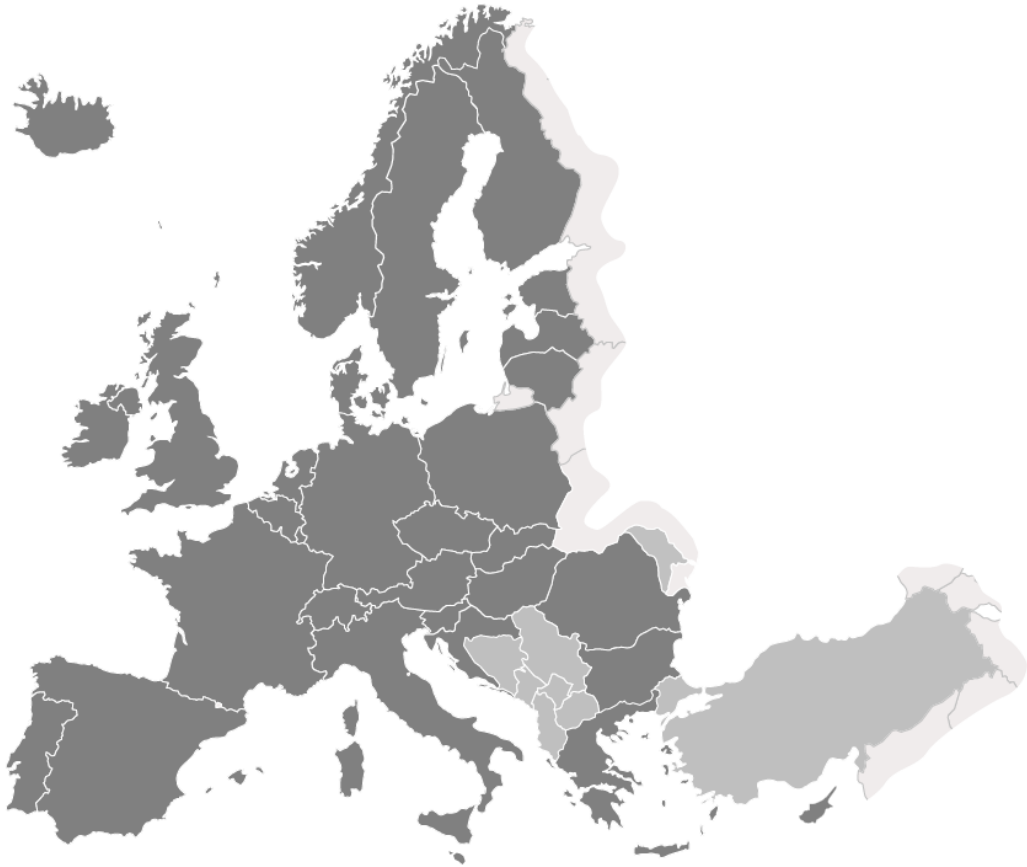


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# WELMEC

European Cooperation in Legal Metrology

## Guide for Devices for Transferring Measured Quantities (DTMQ) associated to bottom loading Measuring Systems



# WELMEC

European Cooperation in Legal Metrology

WELMEC is a cooperation between the legal metrology authorities of the Member States of the European Union and EFTA.

This document is one of a number of Guides published by WELMEC to provide guidance to manufacturers of measuring instruments and to Notified Bodies responsible for conformity assessment of their products.

The Guides are purely advisory and do not themselves impose any restrictions or additional technical requirements beyond those contained in relevant EU Directives.

Alternative approaches may be acceptable, but the guidance provided in this document represents the considered view of WELMEC as to the best practice to be followed.

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# 1 Scope

This document provides metrological and technical requirements for devices for transferring measured quantities (DTMQ) associated to bottom loading measuring systems, as defined in 2.1.

This document is not binding for countries, which would apply other solutions for transferring measured quantities, in particular solutions based on the implementation of procedures of good practices.

## 2 Definitions, abbreviations and symbols

The definitions of OIML R 117-1 edition 2007 apply to this guide and in addition the following:

### 2.1 Device for transferring measured quantities

A set of elements and devices fitted on measuring systems (MS), on a transportation vehicle (truck, wagon...) and also, where applicable, available at the unloading locations, in order to allow, under secured conditions, the loading and the transportation at the unloading (delivery) locations of measured quantities and metrological data. The elements and devices on the transportation vehicle have the possibility to be connected to suitable MS, in particular to their transfer point.

Notes:

1. In principle the hydraulic connected parts are compartments on a truck (or wagon...).
2. According to the definition the DTMQ includes parts on a transportation vehicle, on MS and also where applicable at unloading locations. However in order to facilitate the elaboration of provisions, in the following, DTMQ may designate only parts on the transportation vehicle.
3. For the purpose of this document, a DTMQ involves only parts and functions subject to legal metrological control. Subject to specific provisions specified here under, a truck may include some compartments part of the DTMQ, some compartments not part of the DTMQ and/or some means to measure liquid quantities such as measuring systems.

### 2.2 Secured status of port

The status of a port of a compartment allowing, as far as this port may be concerned, to trust in the integrity of the content of the compartment, and recognisable as such by whoever is involved in the delivery operation. In general, this status is established by means of securing (sealing) devices and the unsecured status results in a warning (alarm indication).

### 2.3 Minimum transportable quantity

The smallest volume of liquid for which the transportation is metrologically acceptable for a DTMQ.

### 2.4 Abbreviations

DTMQ	Devices for Transferring Measured Quantities
DTMQ/TR	DTMQ truck
DTMQ/LR	DTMQ loading rack
MS	Measuring System
OIML R 117	OIML R 117-1 edition 2007 and OIML R 117-2 edition 2014

## **3 General requirements adapted from OIML R 117**

### **3.1 Pattern approval**

3.1.1 The MS used to load the different compartments of the DTMQ shall have been approved in conformance to OIML R 117 and, in addition, in conformance to the specific hereafter provisions.

It shall be either interruptible or any alarm (in the meaning of R 117) during the measurement operation shall not allow transmission of the indication of volume.  
It shall be of full hose type because of the bottom loading.

3.1.2 The part of the DTMQ not on a MS shall have been approved for the specific use set by the hereafter provisions.

3.1.3 All necessary information on the compatibility of all the parts of the DTMQ shall be laid down in pattern approval certificates here above referred.

### **3.2 Scale interval and significant fault**

The magnitude of the significant fault considered for testing a device providing indications on board or at the service station shall be equal to 2 scale intervals. In case of more than one device, all the scale intervals shall be the same.

### **3.3 Minimum transportable quantity**

The minimum transportable quantity shall be greater than or equal to two hundred scale intervals of the DTMQ.

## **4 Essential requirements**

The following constitute the essential requirements applicable to DTMQ. These essential requirements are developed as practical requirements in clause 5. As far as appropriate for some of them and when indicated, means ensuring an equivalent level of metrological security are possible.

Note:

- These requirements correspond to each appropriate item or function but a DTMQ has to fulfil the whole of applicable requirements that is at least provisions in 4.1 to 4.6 and 4.8. Subclause 4.7 is an optional functionality.

### **4.1 Data**

An ancillary device subject to metrological control available at the unloading location shall provide a measuring result.

All appropriate information for a fair and unambiguous settlement of the delivery shall be also available.

### **4.2 Identification**

There shall be an unambiguous relation between the compartment and the measuring result related to a quantity loaded in this compartment.

### **4.3 Transfer of liquid from the measuring system**

The DTMQ shall ensure the secured transfer of liquid from the MS to each relevant compartment of a truck.

### **4.4 Transportation of liquid**

The DTMQ shall ensure the secured transfer of liquid from the loading location (in principle the depot) to the unloading location (in principle the service station).

### **4.5 Delivery and checking of the correct unloading and emptiness**

The DTMQ shall demonstrate for the complete and correct unloading of the quantity from compartments.

### **4.6 Securing returns**

There shall be a means of securing or monitoring the transportation of quantities not unloaded at the delivery location back to the loading location in case of refused or incomplete (frustrated) deliveries.

Note:

- In fact the quantity may be returned to any place where a legal measurement of the undelivered quantity can take place.

The indication of the secured status in the case of securing returns shall differ from the indication of secured status after loading.

## 4.7 Unattended delivery

Preliminary consideration:

Unattended delivery shall only take place in case of agreement between all involved parties and so should be based on a minimum of confidence among them. Mainly for this reason and because provisions providing a higher level of metrological security would be too costly, the following requirements are considered to be sufficient. It is assumed that the remaining risks of accidental or fraudulent use may be minimised by an appropriate surveillance during deliveries (video surveillance, occasional and non announced surveillance, monitoring the levels of liquid in tanks of service-stations even using level gauges not subject to legal control...).

If the DTMQ is intended to be used for unattended delivery means shall:

- give suitable guarantee that the quantity is fairly delivered,
- minimise the risks of accidental or fraudulent withdrawal of liquid,
- allow the retrieval of measuring data until the settlement of the transaction.

Note:

- In general 3 months seem appropriate unless other national practices state otherwise. In particular if the national regulation states a delay for possible dispute about a delivery, data corresponding to a delivery may be deleted on special command after this delay provided that no dispute occurred about this delivery during this delay.

## 4.8 Integrity

The DTMQ shall be designed so that its functions are reliable and durable.

## 5 Practical requirements

See note in introduction of clause 4.

### 5.1 Data

The metrological data shall be made available at the unloading location so that it can be established without ambiguity that the data correspond to the loaded quantities.

This requirement may be fulfilled by one of the following solution.

1. The truck is fitted with on board ancillary devices (subject to metrological control) allowing on demand :
  - to memorise and display measuring results,
  - and/or to memorise and print measuring results.

However, as a consequence of 5.7.6 in case of unattended delivery, memorising and displaying on board is not sufficient.

2. The service (filling) station is fitted with ancillary devices (subject to metrological control) allowing on demand:
  - to memorise and display measuring results,
  - and/or to memorise and print measuring results.

In any case the transfer of data from the MS to the ancillary devices shall be made in a secured way and data shall be associated without ambiguity to the transferred quantity.

- In addition the following data shall be provided in the same conditions :
- the identification of the loaded compartment,
- as far as relevant to a delivery, alarms related to any corrupted data and/or alarms related to breaking or malfunctioning of any software securing device,
- other information and alarms as required in the following document.

All this information shall be available until the settlement of the transaction, according to the case on board or at the service station, on request and legible in a clear manner and without ambiguity.

Note:

- As there is no possibility to see what is the delivered liquid it is also advisable that the nature of the liquid is capable to be displayed.

### 5.2 Identification

5.2.1 Each compartment of the vehicle shall have its own identification.

5.2.2 There shall be an automatic recognition of the identification of the loaded compartment by the DTMQ and the measuring result shall be associated with this identification as long as measuring results are memorised.

### 5.3 Transfer of liquid from the measuring system

The corresponding essential requirement is supposed to be fulfilled provided the full set of following provisions is met. Other solutions providing the same level of confidence are possible.

5.3.1 Securing of all the ports of each compartment that is part of the DTMQ shall be provided. The secured status of each port shall be clearly visible and unambiguous.

5.3.2 The transfer of metrological data from the MS to other parts of the DTMQ shall not be possible in case of unsecured compartments or the detection of failure of software securing devices.



5.3.3 The complete securing of the loaded compartment shall be activated automatically at the loading arm disconnection, within a timescale that makes fraud or withdrawal impossible without detection.

However, it is not required that the loaded quantity be recorded in the on board equipment at this moment (see 5.8.1.1).

5.3.4 Taking into consideration provisions of regulations on security, mechanical sealing of manlids and other ports is acceptable provided that:

- a) Opening of these ports is difficult (e.g. ports closed by bolts with a welded clamp or a seal);
- b) A message is displayed on the secured central system on board, in a clear and non ambiguous form, inviting to check the integrity of the mechanical seals;
- c) The compartment vehicle is equipped with means allowing the check of the status of the mechanical seals (ladder...);
- d) A drawing with location of mechanical seals or closed ports (or a list) shall be clearly visible on or close to the identification plate.

5.3.5 Any unauthorised, accidental or fraudulent liquid withdrawal from a compartment, in particular through the poppet (outlet) valves, shall be impossible or shall be detected, even in case of a top up (complementary) loading of a compartment.

Without prejudice of provisions in 5.6, there shall be no possibility to secure again a compartment after an unsecured status has been detected.

5.3.6 The vehicle shall not be fitted with a manifold.

5.3.7 In the case of a vapour recovery pipe shared by all compartments, a special device shall prevent any liquid transfer from a compartment to another.

## 5.4 Transportation of liquid

The corresponding essential requirement is supposed to be fulfilled provided the full set of following provisions is met. Other solutions providing the same level of confidence are possible.

5.4.1 The provisions in 5.3.1, 5.3.4, 5.3.5, 5.3.6 and 5.3.7 are applicable as far as relevant.

5.4.2 Any alteration of securing of all the ports controlled electronically during transportation shall result in a clear and visible indication that remains available up to the delivery location.

## 5.5 Delivery and checking of the correct unloading and emptiness

### 5.5.1 General

The checking of the correct unloading and emptiness involves two aspects :

- one concerning the fact that by design the truck shall permit the complete draining of liquid,
- one concerning the possibility of fraudulent uses.

#### 5.5.1.1 Draining

5.5.1.1.1 Provisions 4.1.1.5 (three first paragraphs only), 4.1.1.6 and 4.1.3.2 of OIML R 80 shall be fulfilled.

It shall be easy, visually or automatically, to check the compartment and pipe emptiness, before loading and at the end of unloading operations.

Notes :

- 1) The requirement in the last paragraph is supposed to be fulfilled if a sightglass is present at the extremity of the pipe and a means indicates open position of the foot valve of the compartment.

- 2) The requirement in the last paragraph does not prohibit to proceed to new loading if the emptiness is not effective.

5.5.1.1.2 The DTMQ may include a system part of its pattern approval, allowing detection of positions ensuring a correct draining and preventing unloading in case of use in other positions.

#### 5.5.1.2 Frauds

It shall be possible to conclude that there is no possibility, in normal use, to introduce in the compartments devices (pocket...) likely to prevent complete draining of the liquid. This requirement is supposed to be fulfilled if the top of the compartment is permanently sealed or permanently closed.

#### 5.5.2 Additional measuring means

If the DTMQ or compartments not part of the DTMQ are fitted with additional measuring means, in particular on board measuring systems, there shall be no possibility to corrupt the use of the DTMQ as such.

## 5.6 Securing returns

The corresponding essential requirement is supposed to be fulfilled provided the full set of following provisions is met. Other solutions providing the same level of confidence are possible.

5.6.1 The provisions in 5.3.1, 5.3.4, 5.3.5, 5.3.6 and 5.3.7 are applicable as far as relevant.

5.6.2 It shall be a possible either to secure again all the appropriate ports having been unsecured with a view to delivering or to monitor their status, in order to secure returns in case of frustrated or incomplete deliveries with a view to making a legal measurement of the remaining quantity.

The indication of the secured status in the case of securing returns shall differ from the indication of secured status after loading.

5.6.3 In case of securing the ports, this shall be possible only one time and the possibility of its implementation shall be reactivated at the next securing after loading. In case of monitoring it shall be permanent.

5.6.4 A document with appropriate information shall be made available to the receiver before leaving the delivery location. It may be a hand-written document in case of attended delivery.

## 5.7 Unattended delivery

The corresponding essential requirement is supposed to be fulfilled provided the full set of following provisions is met. Other solutions providing the same level of confidence are possible.

5.7.1 The provisions in 5.3.4, 5.3.5, 5.3.6 and 5.3.7 are applicable as far as relevant.

5.7.2 There shall be a means for automatically detect the identification of the unloading location or of the loaded tank in the unloading location. This identification shall be memorised into the on board equipment.

5.7.3 There shall be a means for automatically detecting the complete draining of each compartment. A message or information of complete unloading shall be memorised into the on board equipment. This does not prevent completing an unloading operation of a compartment to a second tank of the same station provided the integrity of the compartment remains under control.

In the course of an unloading operation of a compartment a means shall allow detection of modification of the status emptied or secured of all other compartments even those not part of the DTMQ. In case of such detection an alarm shall be memorised into the on board equipment.

5.7.4 The measuring result, the compartment identification, the date and time of delivery and other information relevant to a delivery as stated here above shall be associated without ambiguity. All this information shall either printed or memorised on board. It shall be kept on board or transferred to any appropriate location until the settlement of the transaction.

5.7.5 In case of frustrated delivery, securing returns shall be automatically implemented.

5.7.6 Provisions shall be implemented in order to make the measurement results and all relevant information, in particular information of correct or incorrect delivery and when relevant correct securing of return, available at the unloading location. This information shall be provided by devices subject to legal control on board and transferred in a secured way to the service station. However and without prejudice of solution 2 in 5.1, if these data need to be memorised and read using appropriate devices belonging to the unloading location, such devices need not to be approved provided the data remain available into the on board equipment until the settlement of the transaction.

Note :

- It is considered as sufficient to ensure the secured transfer of data and that it is up to the owner or custodian of the service station to decide to implement devices subject to legal control or not for memorising and reading data.

5.7.7 In case of deliveries to service stations with significant non horizontal areas (regarding conditions of design ensuring correct draining), the contract referred in the preliminary consideration in 4.7 should inform on the specific procedures and precautions to be taken in order to ensure complete draining of compartments. The use of a DTMQ fitted with an approved system allowing detection of positions ensuring a correct draining, as specified in 5.5.1.1.2, is highly recommended.

5.7.8 National regulations should prohibit the presence on board or the use of objects or devices likely to facilitate frauds or liquid withdrawal is prohibited (container, vessel, multi-way valves, hoses with holes...).

## 5.8 Integrity

### 5.8.1 Transfer of data

5.8.1.1 Transfer of data from the MS to the on board equipment may be achieved automatically or semi-automatically.

If the data transmission is not immediate, a secured means shall exist, allowing them to be allocated to each compartment at the loading location (the loading rack in general).

5.8.1.2 If the data transmission is not immediate a control device shall ensure that the data memorised for a given set of loading for a truck are stored correctly before authorising a new set of loadings by the MS.

5.8.1.3 In any case a control device shall ensure that the data memorised for a given loading is effective and correctly achieved before authorising securing of the compartment.

### 5.8.2 Influence quantities

The following tests shall be performed on each electronic part of the DTMQ likely to have an influence on measuring results and/or its integrity in particular electronic sealing devices.

Performance tests shall be carried out on the relevant parts of the device, according to the requirements set by Annex A of R 117. It shall be considered if they concern mobile or outdoors

parts. As the system could be modular and that parts could provide no indications, it is acceptable to apply specific tests or adaptation of the existing tests to the modules.

According to the requirements set in general requirements on test performances of R 117, it can here be stated the following:

### **Requirements for measuring results**

Influence factors : As a DTMQ does not elaborate itself metrological results but repeat metrological results, the requirement of subclause 3.9.5 in R 117 about deviations between the different devices issuing indications subject to control applies. Moreover all the functions shall operate as designed.

Disturbances : The magnitude of the difference between the volume indicated during the test and the one indicated in reference conditions shall not exceed the value of the significant fault.

### **Requirements for integrity under influence quantities**

The integrity shall not be corrupted under the influence of influence quantities (influence factors and disturbances).

#### **5.8.3 Metrological security**

##### **5.8.3.1 Ancillary devices**

Ancillary devices shall be fitted with checking facilities conforming to R 117. All checking facilities shall be of type P (permanent).

##### **5.8.3.2 Additional and other devices**

For other parts of the DTMQ each necessary device for proper metrological functioning of the equipment, in particular electronic sealing devices, shall operate in “ positive security ”. That is to say that any malfunction of any of them shall prevent the compartment loading or involve the memorising of adequate information in the compartment’s DTMQ system and allow a later control. This indication shall be clear and non-ambiguous and remain available up to the unloading location.

Moreover, if provided the positioning and functioning of the locking detectors shall be made difficult to corrupt.

##### **5.8.3.3 Sealing devices**

Any alteration of the integrity of the devices designed to fulfil the here above requirements shall be prevented or detected, by electronic or mechanical seals if necessary.

##### **5.8.3.4 Principal power supply**

The power supply continuity allowing the correct functioning of the device for transferring measured quantities shall be controlled permanently.

If this continuity is or may be not maintained, a device shall detect the power supply interruption, allow secured memorising of the dates and hours of the power cut and restarting as well as the display of an alarm message informing the operator that a possible break of the securing may have occurred in the meantime.

## **6 Marking**

### **6.1 Identification plate**

Devices for transferring measured quantities shall integrate an identification plate. The plate or any appropriate data sheet provided close to the plate will provide the following information:

- manufacturer's name,
- year of initial verification or of manufacture,
- pattern approval number,
- serial number,
- if relevant, a list or scheme of compartments part of the DTMQ,
- if relevant, whether the DTMQ is not authorised for unattended deliveries,
- if relevant, whether the DTMQ is fitted with an approved system allowing detection of positions ensuring a correct draining (see 5.5.1.1.2),
- a drawing or list with location of mechanical seals.

It shall be visible in normal conditions of use.

### **6.2 Stamp plate**

The device shall be designed to integrate another plate or stamp plate, dedicated to receive the initial verification mark. This plate shall be sealed or permanently fixed near by the identification plate of the device for transferring measured quantities, with which it can combine together.

The stamp plate shall be visible in normal conditions of use.

### **6.3 Verification or inspection marks**

A place shall be provided for applying the stamp or sticker corresponding to the verification or inspection marks of the DTMQ. It shall be visible in normal conditions of use.

## Annex A (informative) - Specific provisions in case of a solution involving a smart card for data transfer

### A.1 Introduction

At the time of elaborating this document the industry is highly interested with a solution involving a smart card for the transfer of metrological data. As it is a new means in legal metrology it seems necessary to propose some acceptable solutions so that all issuing authorities implement harmonised levels of requirements. This annex also provides some acceptable associated means for identifying the unloading location.

The securing of functionalities and data includes two aspects :

1. Securing the DTMQ so that in conditions of normal use the deliveries remain reliable, in particular implementing checking facilities,
2. Securing the DTMQ against fraudulent uses.

A specific attention must be paid to the smart card. For this purpose two approaches were possible concerning securing against fraudulent uses :

1. An intrinsic securing ensuring that at any moment data on the card are not corrupted. This approach would involve a complicated system for its implementation and control, such as the existence of a body managing and distributing software keys.
2. An approach based on the tractability of measuring data, allowing in case of further dispute concerning a delivery to compare the correct data that prevailed at the moment of correct operation. In the following document this pragmatic approach has been considered acceptable. In some cases it can lead to specific requirements that are not specified in general in the main part of this guide.

Moreover although some here after provisions could seem redundant it has been useful to separate provisions ensuring the general securing of the DTMQ and the securing of the smart card.

Any other technical solutions providing the same level of metrological integrity are acceptable.

### A.2 General aspects

#### A.2.1 Loading

POSSIBLE FUNCTIONAL SOLUTION	ACCEPTABLE FUNCTIONAL SECURING
1 The card is associated to the truck (permanently or for the duration of an operation)	
2 The card is extracted from the reading device of the truck (DTMQ/TR) in order to be introduced into the reading device of the loading rack (DTMQ/LR).	

<p>3 Connections for loading are implemented.</p> <p>The first connection implies the initialisation of the clocks of the DTMQ/TR and the DTMQ/LR. Regarding the absolute time, a deviation of approximately 1 s to 2 s is reasonable.</p>	
<p>4 The following is memorised on the card :</p> <ul style="list-style-type: none"> <li>- time (relative) of connection,</li> <li>- measured volume,</li> <li>- time of disconnection.</li> </ul> <p>The following is memorised into the DTMQ/TR :</p> <ul style="list-style-type: none"> <li>- time of connection,</li> <li>- identification of the compartment,</li> <li>- time of disconnection.</li> </ul>	<p>The requirement 4.2 in the WELMEC document necessitates an unambiguous association of events of DTMQ/LR and DTMQ/TR.</p> <p>This requirement is supposed to be fulfilled if the two following conditions are simultaneously met :</p> <ul style="list-style-type: none"> <li>- one event detected by the DTMQ/LR and one event detected by the DTMQ/TR are declared to be corresponding to the same occurrence (detection of connections or disconnections) if the delay (relative time) between the detections is smaller than a maximum permissible value <math>\Delta t</math> (smaller than 5 s),</li> </ul>
<p>5 At the end of loading the card is extracted from the DTMQ/LR and introduced into the DTMQ/TR.</p>	<ul style="list-style-type: none"> <li>- one event detected by the DTMQ/LR and one event detected by the DTMQ/TR are declared to be corresponding to two different occurrences if the delay (relative time) between the events is greater than <math>2 \times \Delta t</math>.</li> </ul> <p>The delays implemented shall be checkable at least at verifications.</p>
<p>6 Possible frauds identified :</p> <p>a) Interchanging the cards of 2 DTMQ/TR</p> <p>b) Writing false data on the card using a false DTMQ/LR .</p>	<p>This risk shall be prevented using either internal procedures and implementing codes of good practices or by technical solutions. This provision is supposed to be fulfilled if there is a systematic registration (automatic or manually) of what truck is supposed to be loaded at what loading rack and the corresponding time, allowing so further inquiry.</p> <p>General problem for securing the card (see A.3)</p>

### A.2.2 Transportation

POSSIBLE FUNCTIONAL SOLUTION	ACCEPTABLE FUNCTIONAL SECURING
	<p>The card remains in the reading device of the DTMQ/TR in order to minimise unnecessary accesses to the card and to the DTMQ/TR.</p>

### A.2.3 Unattended delivery

Preliminary recall: unattended delivery shall necessitate a specific contract.

A.2.3.1 The checking of the identification of the service station is based on the control of duration transfers of the smart card (see illustration here after).

POSSIBLE FUNCTIONAL SOLUTION	ACCEPTABLE FUNCTIONAL SECURING
1 The extraction of the card from the DTMQ/TR implies the initialisation of the on board clock.	
2 The card is introduced into the reading device of the service station DTMQ/SS, which implies the initialisation of the clock of the station.	
3 Before extraction from the DTMQ/SS the identification of the station is written onto the card.	This identification is memorised on board (requirement 5.7.2 in the document).
4 The card is introduced into the DTMQ/TR.	<p>The duration of the complete transfer of the card shall be controlled such that assurance can be given on the fact that the delivery is performed in the appropriate station (requirement 5.7.2 in the document).</p> <p>Except a specific delay laid down in the contract here above referred the delay for transferring the card to the DTMQ/TR trough the DTMQ/SS and back to the DTMQ/TR (duration 1 to 4/see joint scheme) is smaller than 2 min.</p> <p>The delay implemented shall be checkable at least at verifications.</p>
5 The unloading operation is proceeded.	The duration during which the card is in the DTMQ/TR is controlled. It must be compatible with an expected duration, which is calculated according to rules that are validated at pattern approval.
6 Several delivery points in a station may be available.	<p>The rule provided for securing point 4 may be adapted to this case.</p> <p>Any additional delay for this purpose shall be checkable at least at verifications.</p>
<p>7 Before extraction of the card from the DTMQ/TR data are written onto it.</p> <p>Time of extraction is also written. If this is ensured by discontinuous writing of time onto the card, the time interval of writing shall be consistent with the necessary checking of durations foreseen in A.2.3.1.</p>	A specific area on the card shall be used in order to minimise attacks to the card and to the system.



8 The card is transferred to the DTMQ/SS.	The duration of the transfer of the card from the DTMQ/TR to the DTMQ/SS is controlled (requirement 5.7.2 in the document).  This maximum permissible delay shall be smaller or equal to half the delay authorised for duration 1-4.
9	Any abnormal event shall invalidate the operation in accordance with general provisions.

A.2.3.2 In alternative with solution in A.2.3.1, any provision relevant for the identification of the service station may be replaced with the following.

The identification may be determined using a global positioning system (GPS) for the localisation of the truck. The GPS allows a suitable resolution for the localisation, is part of the pattern approval and is described with sufficient information for ensuring the conformity to the approved pattern.

If the GPS is not capable of identifying the service station a device shall prevent the validation of the delivery in accordance with general provisions.

A.2.3.3 It is recalled that here above solutions are not exclusive from other solutions providing the same level of secured identification of the service station, or better, of the particular tanks in the station, according to 5.7.2.

As an example, a way of identifying the service station (and possibly the tanks) may be performed using one (or several) secured radio frequency transponder(s) (RFT). The securing or the RFT(s) shall include provisions for its identification and non-falsification (simulation).

There may be two or more means implemented for securing the identification, operating simultaneously or alternatively.

## **A.3 Securing the smart card**

### **A.3.1 Securing the data in conditions of normal use**

In any cases the securing of data in conditions of normal use is provided by implementing technical solutions allowing the checking of data on the smart card using checking facilities, according to the philosophy of R 117 and adapted to the transfer using a smart card.

Performance tests related to the card and appropriate reading devices are performed when the card is inserted into these devices. These devices shall be connected to other ancillary devices part of the pattern approval.

### **A.3.2 Securing against fraudulent uses**

This securing is obtained by establishing the tractability of measuring data as detailed in A.3.2.1 and next subclauses.

In addition, the risk of manipulating metrological data shall be minimised as far as possible, without having to implement software keys. This provision is supposed to be fulfilled if the set of provisions is met :

- metrological data and associated data for a given delivery are written on the card in a specific area exclusive from other data,
- metrological data are memorised on the relevant memory device after each transfer through the card,

- metrological data are erased from the card immediately after receiving acknowledgement of successful transfer to each appropriate memory device,
- in addition to protecting in writing, metrological data stored in memory devices subject to legal control may be only read using ancillary devices subject to legal control,
- the software protection level is high as defined in the WELMEC guide “Software requirements on the basis of the measuring directive” (however the software examination level and the degree of software conformity are middle),
- if existing, the software on the card is part of the pattern approval.

#### A.3.2.1 Loading

##### **Devices**

1. The DTMQ/LR is fitted with a memory device subject to legal control.
2. The DTMQ/TR is fitted with a memory device subject to legal control.

##### **Data**

1. In order to identify the operation and the truck, the DTMQ/TR generates a random number that is transferred to and stored into the memory device of the DTMQ/LR. This number is associated to metrological relevant data that are memorised in the DTMQ/LR.
2. In order to identify the measuring system, the DTMQ/LR generates the identification of each relevant measuring system. This identification shall be transferred to and stored into the memory device of the DTMQ/TR.
3. In order to identify the measurement, the DTMQ/LR generates a measurement number for each relevant measuring system. One measurement number shall be unique for each measuring system for each period of three months at least. This number shall be transferred to and stored into the memory device of the DTMQ/TR.
4. Metrological data and the date and hour of transfer of data are stored into the memory device of the DTMQ/TR.

#### A.3.2.2 Unattended delivery

##### A.3.2.2.1 Station identified using an identification stored in a memory device

##### **Devices**

1. The DTMQ/TR is fitted with a memory device subject to legal control.
2. The DTMQ/SS is fitted with a memory device subject to legal control (because the identification is based on the memory device).

##### **Data**

1. In order to autenticate the identification of the station, the DTMQ/SS generates a random number. This number and the identification are transferred to and stored into the memory device of the DTMQ/TR. These data are associated to other relevant metrological data.
2. In order to autenticate the identification of the delivery, the DTMQ/TR generates a random number which is transferred to and stored into the memory device of the DTMQ/SS together with metrological data (including alarms if relevant and those referred in A.3.2.1), date and hour of transfer.

#### A.3.2.2.2 Station identified using a GPS

##### **Devices**

1. The DTMQ/TR is fitted with a memory device subject to legal control and a GPS conforming to A.2.3.2.
2. The service station is fitted with a memory device subject to legal control or not (see 5.7.6).

##### **Data**

1. The identification of the station is performed by the localisation of the truck using the GPS. This identification is associated to metrological relevant data.
2. In order to authenticate the identification of the delivery, the DTMQ/TR generates a random number which is transferred to and stored into the memory device of the DTMQ/SS together with metrological data (including alarms if relevant and those referred in A.3.2.1), date and hour of transfer.

#### A.3.2.2.3 Station identified using other means

If means other than those here above described are implemented they shall provide the same level of securing.

There may be two or more means implemented for securing the identification, operating simultaneously or alternatively.

**SMART CARD TRANSFERS IN CASE OF UNATTENDED DELIVERY**  
(and solution referred in A.2.3.1)

