

AMENDMENT NO. 1 (11 / 2022)
TO
AIS-059

Automotive Vehicles - Recording Equipment in Road Vehicles (Tachograph)

1 Page No III, Introduction, second last and last paragraphs

Substitute following text for existing text

While preparing this standard, considerable assistance has been taken from EEC Directive 3821/85 (Issue2, Dec. 2003) (as amended by 3314/90, 3572/90, 3688/92,2479/95,1056/97, 2135/98 and 1360/2002 and regulation EC No.1882/2002), Regulation (EC) No 561/2006, REGULATION (EU) No 1266/2009, REGULATION (EU) No 165/2014 on Recording equipment in road transport.

The Automotive Industry Standards Committee responsible for preparation of this standard is given in Annexure-IV.

2 Page No 1/33, Clause No. 1.0

Substitute following text for existing text

“1.0 SCOPE:

This standard sets out requirements in relation to the construction, installation, use, testing and control of tachographs used in road vehicles.”

Tachographs shall, as regards their construction, installation, use and testing, comply with the requirements of this Standard.

3 Page No 1/33, Clause No. 2.3

Substitute following text for existing text

“AIS-004 (Part 3): 2009: Automotive Vehicles - Requirements for Electromagnetic Compatibility.”

4 Page No 1/33, Clause No 2.0 REFERENCES

Add new clause 2.4 after Clause No. 2.3

“2.4 AIS-004 (Part 3) (Rev1):2020: Automotive Vehicles - Requirements for Electromagnetic Compatibility.”

5 Page No 1/33, Clause No. 3.0

Substitute following text for existing text

“3. APPLICATION FOR TYPE APPROVAL OF TACHOGRAPH

3.1 Manufacturers or their representative shall apply for approval of a type of vehicle unit, motion sensor, tachograph card to the test agency.

3.2 An application for type-approval shall be accompanied by the appropriate specifications, including necessary information regarding the seals, and by security, functionality and interoperability certificates. The security certificate shall be issued by a recognised certification body designated by Government.

- 3.3 Functionality certificates and interoperability certificate shall be issued to the manufacturer by the test agency.
- 3.4 In respect of tachographs, their relevant components, and tachograph cards:
- (a) the security certificate shall certify the following for the vehicle unit, tachograph cards, motion sensor, and connection to the GNSS receiver when the GNSS is not embedded in the vehicle units:
 - (i) compliance with security targets;
 - (ii) fulfilment of the following security functions: identification and authentication, authorisation, confidentiality, accountability, integrity, audit, accuracy and reliability of service;
 - (b) the functional certificate shall certify that the tested item fulfils the appropriate requirements in terms of functions performed, environmental characteristics, electromagnetic compatibility characteristics, compliance with physical requirements and compliance with other applicable standards;
 - (c) the interoperability certificate shall certify that the tested item is fully interoperable with the necessary tachographs or tachograph card models.
- 3.5 Any modification in software or hardware of the tachograph or in the nature of materials used for its manufacture shall, before being applied, be notified to the test agency which granted type-approval for the equipment.
- That test agency shall confirm to the manufacturer the extension of the type-approval, or may require an update or a confirmation of the relevant functional, security and/or interoperability certificates.
- Any modifications or additions to an approved model must receive additional type-approval from the test agency which granted the original type-approval.
- 3.6 To detect manipulation of motion data, information from the motion sensor shall be corroborated by vehicle motion information derived from one or more source(s) independent from the motion sensor.
- 3.7 The requirements for extension of type approval because of modification(s) in approved model are given in Annexure IV.”

6 Page No 1/33, Clause No. 4.0

Substitute following text for existing text

“4.0 REQUIREMENT OF CONSTRUCTION, TESTING AND INSTALLATION

Tachograph shall satisfy the construction and installation requirement as given in Annexure I (Digital Tachograph).

Note: Recording equipment in the standard has been referred as tachograph.”

7 Page No 2/33

Add new Clause No. 5.3.6 as below

“5.3.6 Over-voltage protection

Verify that the vehicle unit can withstand a power supply of:

24V versions: 34 V at + 40 °C 1 hour

12V versions: 17 V at + 40 °C 1 hour.”

8 Page No 2/33

Add new Clause No. 5.3.7 as below

“5.3.7 Short-circuit protection

Verify that input output signals are protected against short circuits to power supply and ground”

9 Page No 4/33, Clause No 5.6

Substitute following text for existing text

“5.6 EMC TEST

The tachograph shall meet the requirements of EMC as per AIS-004 (Part 3) or AIS-004 (Part 3) (Rev. 1), as amended from time to time.

The tachograph shall be protected against electrostatic discharges and shall comply with the requirements of IEC: 61000 – 4 - 2, ± 2 kV (Level 1).”

10 Page No 7/33, Delete ANNEXURE I

11 Page No 16/33, Renumber ANNEXURE II, ANNEXURE III, ANNEXURE IV, ANNEXURE V

Renumber “ANNEXURE II” as “ANNEXURE I”

Renumber “ANNEXURE III” as “ANNEXURE II”

Renumber “ANNEXURE IV” as “ANNEXURE III”

Renumber “ANNEXURE V” as “ANNEXURE IV”

12 Page No 16/33, existing ANNEXURE II, Clause No. 1

Substitute following text for existing text

“1.0 DEFINITIONS

For the purposes of this standard the following definitions shall apply:

1.1 **‘carriage by road’** means any journey made entirely or in part on roads open to the public by a vehicle, whether laden or not, used for the carriage of passengers or goods;

1.2 **‘driver’** means any person who drives the vehicle even for a short period, or who is carried in a vehicle as part of his duties to be available for driving if necessary;

- 1.3 **'break'** means any period during which a driver may not carry out any driving or any other work and which is used exclusively for recuperation;
- 1.4 **'other work'** means all activities except 'driving', including any work for the same or another employer, within or outside of the transport sector;
- 1.5 **'rest'** means any uninterrupted period during which a driver may freely dispose of his time;
- 1.6 **'daily rest period'** means the daily period during which a driver may freely dispose of his time and covers a 'regular daily rest period' and a 'reduced daily rest period':
- 1.7 **'regular daily rest period'** means any period of rest of at least 11 hours. Alternatively, this regular daily rest period may be taken in two periods, the first of which must be an uninterrupted period of at least 3 hours and the second an uninterrupted period of at least nine hours.
- 1.8 **'reduced daily rest period'** means any period of rest of at least nine hours but less than 11 hours;
- 1.9 **'weekly rest period'** means the weekly period during which a driver may freely dispose of his time and covers a **'regular weekly rest period'** and a **'reduced weekly rest period'**
- 1.10 **'regular weekly rest period'** means any period of rest of at least 45 hours,
- 1.11 **'reduced weekly rest period'** means any period of rest of less than 45 hours, which may be shortened to a minimum of 24 consecutive hours;
- 1.12 **'a week'** means the period of time between 00.00 on Monday and 24.00 on Sunday;
- 1.13 **'driving time'** means the duration of driving activity recorded automatically by the recording equipment as defined in this standard.
- 1.14 **'daily driving time'** means the total accumulated driving time between the end of one daily rest period and the beginning of the following daily rest period or between a daily rest period and a weekly rest period;
- 1.15 **'weekly driving time'** means the total accumulated driving time during a week;
- 1.16 **'maximum permissible mass'** means the maximum authorised operating mass of a vehicle when fully laden;
- 1.17 **'regular passenger services'** means national services common rules for the carriage of passengers by coach and bus
- 1.18 **'multi-manning'** means the situation where, during each period of driving between any two consecutive daily rest periods, or between a daily rest period and a weekly rest period, there are at least two drivers in the vehicle to do the driving. For the first hour of multi-manning the presence of another driver or drivers is optional but for the remainder of the period it is compulsory;

- 1.19 **‘driving period’** means the accumulated driving time from when a driver commences driving following a rest period or a break until he takes a rest period or a break. The driving period may be continuous or broken.
- 1.20 **‘tachograph’ or ‘recording equipment’** means the equipment intended for installation in road vehicles to display, record, print, store and output automatically details of the movement, including the speed, of such vehicles, and details of certain periods of activity of their drivers;
- 1.21 **‘vehicle unit’** means the tachograph excluding the motion sensor and the cables connecting the motion sensor. The vehicle unit may be a single unit or several units distributed in the vehicle, provided that it complies with the security requirements of this Standard; the vehicle unit includes, among other things, a processing unit, a data memory, a time measurement function, two smart card interface devices for driver and co-driver, a printer, a display, connectors and facilities for entering the user’s inputs;
- 1.22 **‘motion sensor’** means a part of the tachograph providing a signal representative of vehicle speed and/or distance travelled;
- 1.23 **‘tachograph card’** means a smart card, intended for use with the tachograph, which allows identification by the tachograph of the role of the cardholder and allows data transfer and storage;
- 1.24 **‘driver card’** means a tachograph card, issued by the authorities to a particular driver, which identifies the driver and allows for the storage of driver activity data;
- 1.25 **‘digital tachograph’** means a tachograph using a tachograph card in accordance with this Standard;
- 1.26 **‘control card’** means a tachograph card issued by the authorities to a state/national competent control authority which identifies the control body and, optionally, the control officer, and which allows access to the data stored in the data memory or in the driver cards and, optionally, in the workshop cards for reading, printing and/or downloading;
- 1.27 **‘company card’** means a tachograph card issued by the authorities to a transport company needing to operate vehicles fitted with a tachograph, which identifies the transport company and allows for the displaying, downloading and printing of the data, stored in the tachograph, which have been locked by that transport company;
- 1.28 **‘workshop card’** means a tachograph card issued by the authorities to designated staff of a tachograph manufacturer, a fitter, a vehicle manufacturer or a workshop, approved by authorities, which identifies the cardholder and allows for the testing, calibration and activation of tachographs, and/or downloading from them;
- 1.29 **‘activation’** means the phase in which the tachograph becomes fully operational and implements all functions, including security functions, through the use of a workshop card;
- 1.30 **“Authentication”** means a function intended to establish and verify a claimed identity;

- 1.31 **“Authenticity”** means the property that an information is coming from a party whose identity can be verified;
- 1.32 **“Built-in-test (BIT)”** means tests run at request, triggered by the operator or by an external equipment;
- 1.33 **“Calendar day”** means a day ranging from 00.00 hours to 24.00 hours. All calendar days relate to IST time
- 1.34 **‘card number’** means: a 16 alpha-numerical characters number that uniquely identifies a tachograph card within a country. The card number includes a consecutive index (if applicable), a replacement index and a renewal index; a card is therefore uniquely identified by the code of the issuing State and the card number;
- 1.35 **‘card consecutive index’** means: the 14th alpha-numerical character of a card number that is used to differentiate the different cards issued to a company or a body entitled to be issued several tachograph cards. The company or the body is uniquely identified by the 13 first characters of the card number;
- 1.36 **‘card renewal index’** means: the 16th alpha-numerical character of a card number which is incremented each time a tachograph card is renewed;
- 1.37 **“Card replacement index”** means: the 15th alpha-numerical character of a card number which is incremented each time a tachograph card replaced.
- 1.38 **‘characteristic coefficient of the vehicle’** means:
- the numerical characteristic giving the value of the output signal emitted by the part of the vehicle linking it with the recording equipment (gearbox output shaft or axle) while the vehicle travels a distance of one kilometre under standard test conditions.
- The characteristic coefficient is expressed in impulses per kilometre ($w = \dots$ imp/km);
- 1.39 **‘constant of the recording equipment’** means:
- the numerical characteristic giving the value of the input signal required to show and record a distance travelled of one kilometre; this constant shall be expressed in impulses per kilometre ($k = \dots$ imp/km);
- 1.40 **‘data memory’** means: an electronic data storage device built into the recording equipment;
- 1.41 **‘digital signature’** means: data appended to, or a cryptographic transformation of, a block of data that allows the recipient of the block of data to prove the authenticity and integrity of the block of data;

- 1.42 **‘effective circumference of the wheel tyres’ means:** the average of the distances travelled by each of the wheels moving the vehicle (driving wheels) in the course of one complete rotation. The measurement of these distances shall be made under standard test conditions and is expressed in the form ‘l = ... mm’. Vehicle manufacturers may replace the measurement of these distances by a theoretical calculation which takes into account the distribution of the weight on the axles, vehicle unladen in normal running order. The methods for such theoretical calculation will be approved by a competent authority;
- 1.43 **‘over speeding’ means:** exceeding the authorised speed of the vehicle, defined as any period of more than 60 seconds during which the vehicle's measured speed exceeds the limit for setting the speed limitation device on the installation and use of speed limitation devices for certain categories of motor vehicles in the Community;
- 1.44 **‘motion sensor’ means:** part of the recording equipment, providing a signal representative of vehicle speed and/or distance travelled;
- 1.45 **‘printer’ means:** component of the recording equipment which provides printouts of stored data;
- 1.46 **‘self test’ means:** tests run cyclically and automatically by the recording equipment to detect faults;
- 1.47 **‘security certification’ means:** process to certify, by certification body, that the recording equipment (or component) or the tachograph card under investigation fulfils the security requirements defined in Generic security targets;
- 1.48 **‘tyre size’ means:** the designation of the dimensions of the tyres
- 1.49 **‘vehicle identification’ means:** numbers identifying the vehicle: vehicle registration number (VRN) with indication of the registering authority and vehicle identification number (VIN)
- 1.50 **for computing sake in the recording equipment ‘week’ means:** the period between 00.00 hours UTC on Monday and 24.00 UTC on Sunday;
- 1.51 **‘calibration’** of a digital tachograph means updating or confirming vehicle parameters, including vehicle identification and vehicle characteristics, to be held in the data memory through the use of a workshop card;
- 1.52 **‘downloading’** from a digital tachograph means the copying, together with the digital signature, of a part, or of a complete set, of data files recorded in the data memory of the vehicle unit or in the memory of a tachograph card, provided that this process does not alter or delete any stored data;
- 1.53 **‘event’** means an abnormal operation detected by the digital tachograph which may result from a fraud attempt;
- 1.54 **‘fault’** means an abnormal operation detected by the digital tachograph which may result from an equipment malfunction or failure;
- 1.55 **‘installation’** means the mounting of a tachograph in a vehicle;

- 1.56 **‘non-valid card’** means a card detected as faulty, or whose initial authentication failed, or whose start of validity date is not yet reached, or whose expiry date has passed;
- 1.57 **‘periodic inspection’** means a set of operations performed to check that the tachograph works properly, that its settings correspond to the vehicle parameters, and that no manipulation devices are attached to the tachograph;
- 1.58 **‘repair’** means any repair of a motion sensor or of a vehicle unit that requires the disconnection of its power supply, or its disconnection from other tachograph components, or the opening of the motion sensor or vehicle unit;
- 1.59 **‘replacement’ means:** issue of a tachograph card in replacement of an existing card, which has been declared lost, stolen or malfunctioning and has not been returned to the issuing authority. Replacement always implies a risk that two valid cards may co-exist;
- 1.60 **‘renewal’ means:** issue of a new tachograph card when an existing card reaches its expiry date, or is malfunctioning and has been returned to the issuing authority. Renewal always implies the certainty that two valid cards do not co-exist;
- 1.61 **‘recording equipment’ means:** the total equipment intended for installation in road vehicles to show, record and store automatically or semi-automatically details of the movement of such vehicles and of certain work periods of their drivers;
- 1.62 **‘type-approval’** means a process to certify, that the tachograph, its relevant components or the tachograph card to be introduced to market fulfil the requirements of this standard;
- 1.63 **‘interoperability’** means the capacity of systems and the underlying business processes to exchange data and to share information;
- 1.64 **‘interface’** means a facility between systems which provides the media through which they can connect and interact;
- 1.65 **‘time measurement’** means a permanent digital record of the coordinated universal date and time (UTC);
- 1.66 **‘time adjustment’** means an automatic adjustment of current time at regular intervals and within a maximum tolerance of one minute, or an adjustment performed during calibration;
- 1.67 **‘open standard’** means a standard set out in a standard specification document available freely or at a nominal charge which it is permissible to copy, distribute or use for no fee or for a nominal fee.”

Add new clauses 2.1.7 to 2.1.14 after Clause No. 2.1.6

“2.1.7 The recording of data by the tachograph, as well as developing technologies for the recording of position data, remote communication and the interface with ITS, will entail the processing of personal data. Therefore, the relevant national rules, in particular those laid down shall, apply.

- 2.1.8 In order to allow for fair competition in the development of applications related to the tachograph, intellectual property rights and patents related to the transmission of data in or out of the tachograph should be available to all on a royalty-free basis.
- 2.1.9 Where applicable, the data exchanged during communication with the control authorities in the country should comply with relevant international standards, such as the suite of standards related to Dedicated Short-Range Communication established by the European Committee for Standardisation.
- 2.1.10 The interface between motion sensors and vehicle units shall be compliant with ISO 16844-3:2004, Cor 1:2006’.
- 2.1.11 In order to visualise the local time, it shall be possible to change the offset of the time displayed, in half hour steps. No other offsets than negative or positive multiples of half hours shall be allowed
- 2.1.12 The first change of activity to REST or AVAILABILITY arising within 120 seconds of the automatic change to WORK due to the vehicle stop shall be assumed to have happened at the time of vehicle stop (therefore possibly cancelling the change to WORK).’
- 2.1.13 Given a calendar minute, if DRIVING is registered as the activity of both the immediately preceding and immediately succeeding minute, the whole minute shall be regarded as DRIVING.’
- 2.1.14 Given a calendar minute that is not regarded as DRIVING according to the previous requirement clause 2.1.3, the whole minute shall be regarded to be of the same type of activity as the longest continuous activity within the minute (or the latest of equally long activities).”

14 Page No 20/33, Clause No. 2.2

Substitute following text for existing text

“2.2 FUNCTIONS OF THE DIGITAL TACHOGRAPH

Digital tachographs shall ensure the following functions:

- (a) speed and distance measurement;
- (b) monitoring driver activities and driving status;
- (c) monitoring the insertion and withdrawal of tachograph cards;
- (d) recording of drivers’ manual entries;
- (e) calibration;
- (f) automatic recording of the position points referred in Clause 2.6.1.1;
- (g) monitoring control activities;
- (h) detection and recording of events and faults;
- (i) reading from data memory and recording and storing in data memory;
- (j) reading from tachograph cards and recording and storing in tachograph cards;

- (k) displaying, warning, printing and downloading data to external devices;
- (l) time adjustment and measurement;
- (m) remote communication;
- (n) company locks management;
- (o) built-in and self-tests.”

15 Page No 20/33, Clause No. 2.3

Substitute following text for existing text

2.3 REQUIREMENTS AND DATA TO BE RECORDED

2.3.1 Tachographs and tachograph cards shall comply with the following requirements.

They shall:

- a) record data related to the driver, driver activity and the vehicle which shall be accurate and reliable;
- b) be secure, in particular guaranteeing the integrity and the origin of the source of data recorded by and retrieved from vehicle units and motion sensors;
- c) be interoperable as between the various generations of vehicle units and tachograph cards;
- d) allow for efficient verification of compliance with this standard and other applicable legal acts;
- e) be user-friendly.

2.3.2 Digital tachographs shall record the following data:

- (a) the distance travelled, and the speed of the vehicle;
- (b) time measurement;
- (c) position points as referred to in clause 2.6.1.1;
- (d) the identity of the driver;
- (e) the activity of the driver;
- (f) control, calibration and tachograph repair data, including the identity of the workshop;
- (g) events and faults.

2.3.3 Access to the data stored in the tachograph and the tachograph card may be granted at all times to:

- (a) the competent control authorities;
- (b) the relevant transport company so that it can comply with its legal obligations.

- 2.3.4 The downloading of data shall be performed with the minimum of delay to transport companies or drivers.
- 2.3.5 The downloading function is not accessible in the operational mode (except as provided for in Clause 2.3.6), and except downloading a driver card when no other card is inserted into the Vehicle Unit (VU)
- 2.3.6 In addition and as an optional feature, the recording equipment may, in any mode of operation, download data through another connector to a company authenticated through this channel. In such a case, company mode data access rights shall apply to this download.
- 2.3.7 In the company mode, driver related data can be output only for periods where no lock exists or no other company holds a lock (as identified by the first 13 digits of the company card number).
- 2.3.8 Data recorded by the tachograph which may be transmitted in or out of the tachograph, whether wirelessly or electronically, shall be in the form of publicly available protocols as defined in open standards.
- 2.3.9 The detailed provisions referred to in clause 2.6.1.1 shall, where appropriate, be based on standards and shall guarantee interoperability and compatibility between the various generations of vehicle units and all tachograph cards.”

15 Page No 20/33

Add new Clause No. 2.4 and its sub-clauses after clause 2.3

“2.4. DISPLAY AND WARNING

- 2.4.1 Information contained in digital tachographs and tachograph cards relating to vehicle activities and to drivers and co-drivers shall be displayed in a clear, unambiguous and ergonomic way.
- 2.4.2 The following information shall be displayed:
- (a) time;
 - (b) mode of operation;
 - (c) driver activity:
 - i. if the current activity is driving, the driver’s current continuous driving time and the current cumulative break time,
 - ii. if the current activity is availability/other work/rest or break, the current duration of that activity (since it was selected) and the current cumulative break time;
 - (d) data related to warnings;
 - (e) data related to menu access.
- Additional information may be displayed, provided that it is clearly distinguishable from the information required in this paragraph.
- 2.4.3 Digital tachographs shall warn drivers when detecting any event and/or fault, and before and at the time of exceeding the maximum allowed continuous driving time, in order to facilitate compliance with the relevant legislation.

- 2.4.4 Warnings shall be visual and may also be audible. Warnings shall have a duration of at least 30 seconds, unless they are acknowledged by the user by pushing any key of the tachograph. The reason for the warning shall be displayed and shall remain visible until acknowledged by the user using a specific key or command of the tachograph.”

16 Page No 20/33

Add new Clause No. 2.5 and its sub-clauses

“2.5. DATA PROTECTION

- 2.5.1 Tachograph manufacturer shall ensure that the processing of personal data in the context of this Standard is carried out solely for the purpose of verifying compliance with this Standard and under the supervision of the supervisory authority.
- 2.5.2 Tachograph manufacturer shall, in particular, ensure that personal data are protected against uses other than those strictly linked to this Standard and, in relation to:
- (a) the use of a global navigation satellite system (GNSS) for the recording of location data as referred to in Clause 2.6.1.1,
 - (b) the use of remote communication for control purposes as referred to in Clause 2.6.2,
 - (c) the use of tachographs with an interface as referred to in Clause 2.6.3,
 - (d) the electronic exchange of information on driver cards,
 - (e) the keeping of records by transport companies.
- 2.5.3 Digital tachographs shall be designed in such a way as to ensure privacy. Only data necessary for the purposes of this Standard shall be processed.”

17 Page No 20/33

Add new Clause No. 2.6 and its sub-clauses

“2.6 SMART TACHOGRAPH

- 2.6.1 Recording of the position of the vehicle at certain points during the daily working period
- 2.6.1.1 In order to facilitate the verification of compliance with the relevant legislation, the position of the vehicle shall be recorded automatically at the following points, or at the closest point to such places where the satellite signal is available:
- (a) the starting place of the daily working period;
 - (b) every three hours of accumulated driving time;
 - (c) the ending place of the daily working period.
- For that purpose, vehicles shall be fitted with a tachograph connected to a positioning service based on a satellite navigation system.
- 2.6.1.2 As regards the connection of the tachograph to a positioning service based

on a satellite navigation system, as referred to in clause 2.6.1.1, use shall be made only of service connections that exploit a positioning service free of charge. No position data other than those expressed, wherever possible, in geographical coordinates for determining the points referred to in clause 2.6.1.1, shall be permanently stored in the tachograph. Position data which need to be temporarily stored in order to allow for the automatic recording of the points referred to in clause 2.6.1.1 or to corroborate the motion sensor shall not be accessible to any user and shall automatically be deleted once they are no longer required for those purposes.

2.6.2 REMOTE EARLY DETECTION OF POSSIBLE MANIPULATION OR MISUSE

2.6.2.1 In order to facilitate targeted roadside checks by the competent control authorities, tachographs installed in vehicles shall be able to communicate to those authorities while the vehicle is in motion.

2.6.2.2 The communication referred to in clause 2.6.2.1 shall be established with the tachograph only when so requested by the equipment of the control authorities. It shall be secured to ensure data integrity and authentication of the recording and control equipment. Access to the data communicated shall be restricted to control authorities authorised to check infringements of this Standard and to workshops in so far as it is necessary to verify the correct functioning of the tachograph.

2.6.2.3 The data exchanged during communication shall be limited to the data necessary for the purpose of targeted roadside checks of vehicles with a potentially manipulated or misused tachograph. Such data shall relate to the following events or data recorded by the tachograph:

- (a) the latest security breach attempt,
- (b) the longest power supply interruption,
- (c) sensor fault,
- (d) motion data error,
- (e) vehicle motion conflict,
- (f) driving without a valid card,
- (g) card insertion while driving,
- (h) time adjustment data,
- (i) calibration data including the dates of the two latest calibrations,
- (j) vehicle registration number,
- (k) speed recorded by the tachograph.

2.6.3 INTERFACE WITH INTELLIGENT TRANSPORT SYSTEMS

2.6.3.1 The tachographs may be equipped with standardised interfaces allowing the data recorded or produced by tachograph to be used in operational mode, by an external device, provided that the following conditions are met:

- (a) the interface does not affect the authenticity and the integrity of the

data of the tachograph;

- (b) the interface complies with the detailed provisions of Clause No 2.6.4 of this standard;
- (c) the external device connected to the interface has access to personal data, including geo-positioning data, only after the verifiable consent of the driver to whom the data relates.

2.6.4. DETAILED PROVISIONS FOR SMART TACHOGRAPHS

2.6.4.1 In order to ensure that smart tachographs comply with the principles and requirements set out in this Standard, the tachograph manufacturer shall, adopt detailed provisions necessary for the uniform application of clause 2.6.1, 2.6.2 and 2.6.3, excluding any provisions which would provide for the recording of additional data by the tachograph.

2.6.4.2 The detailed provisions referred to in the clause 2.6.4.1 shall:

- (a) in relation to the performance of the functions of the smart tachograph as referred to in this clause 2.6, include the necessary requirements to guarantee the security, accuracy and reliability of data as provided to the tachograph by the satellite positioning service and the remote communication technology referred to in clause 2.6.1 and 2.6.2;
- (b) specify the various conditions and requirements for the satellite positioning service and the remote communication technology referred to in clause 2.6.1 and 2.6.2 to be either outside or embedded in the tachograph and, when outside, specify the conditions for the use of the satellite positioning signal as a second motion sensor;
- (c) specify the necessary standards for the interface referred to in clause 2.6.3. Such standards may include a provision on the distribution of access rights for drivers, workshops and transport companies, and control roles for the data recorded by the tachograph, which control roles shall be based on an authentication/authorisation mechanism defined for the interface, such as a certificate for each level of access and subject to the technical feasibility thereof.”

18 Page No 21/33, Clause No. 4.0

Substitute following text for existing text

4.0 SECURITY

4.1 The system security aims at protecting the data memory in such a way as to prevent unauthorized access to and manipulation of the data and detecting any such attempts, protecting the integrity and authenticity of data exchanged between the speed sensor and the vehicle unit, protecting the integrity and authenticity of data exchanged between the tachograph and the tachograph cards, and verifying the integrity and authenticity of data download.

- 4.2 Manufacturers shall design, test and review vehicle units, motion sensors and tachograph cards put into production so as to detect vulnerabilities arising in all phases of the product life-cycle, and shall prevent or mitigate their possible exploitation.
- 4.3 For this purpose, manufacturers shall submit the documentation necessary for vulnerability analysis to the certification body designated by government.
- 4.4 For the purposes of clause 4.2, the certification body designated by government shall conduct tests on vehicle units, motion sensors and tachograph cards to confirm that known vulnerabilities cannot be exploited by individuals in possession of publicly available knowledge.
- 4.5 If, in the course of the tests referred to in clause 4.2, vulnerabilities in system elements (vehicle units, motion sensors and tachograph cards) are detected, those elements shall not be put on the market.

If vulnerabilities are detected in the course of the tests referred to in clause 4.4 for elements already on the market, the manufacturer shall inform the test agency which granted the type-approval.

Test agency shall take all measures necessary to ensure that the problem is addressed, in particular by the manufacturer, and shall inform the ministry without delay of the vulnerabilities detected and of the measures envisaged or taken, including where necessary the withdrawal of type-approval.

19 Page No 23/33, Clause No. 5.7

Substitute following text for existing text

“5.7 DETECTION OF EVENTS AND/OR FAULTS

This function shall detect the following events and/or faults:

5.7.1 Insertion of a non-valid card“ event

This event shall be triggered at the insertion of any non-valid card and/or when an inserted valid card expires.

5.7.2 ‘Card conflict’ event

This event shall be triggered when any of the valid cards combination noted X in the following table arise:

Card conflict		Driver slot				
		No card	Driver card	Control card	Workshop card	Company card
Co-driver slot	No card					
	Driver card				X	
	Control card			X	X	X
	Workshop card		X	X	X	X
	Company card			X	X	X

5.7.3 ‘Time overlap’ event

This event shall be triggered when the date/time of last withdrawal of a driver card, as read from the card, is later than the current date/time of the recording equipment in which the card is inserted.

5.7.4 ‘Driving without an appropriate card’ event

This event shall be triggered for any tachograph cards combination noted X in the following table, when driver activity changes to DRIVING, or when there is a change of the mode of operation while driver activity is DRIVING:

Driving without an appropriate card		Driver slot				
		No (or non-valid) card	Driver card	Control card	Workshop card	Company card
Co-driver slot	No (or non-valid) card	X		X		X
	Driver card	X		X	X	X
	Control card	X	X	X	X	X
	Workshop card	X	X	X		X
	Company card	X	X	X	X	X

5.7.5 ‘Card insertion while driving’ event

This event shall be triggered when a tachograph card is inserted in any slot, while driver activity is DRIVING.

5.7.6 ‘Last card session not correctly closed’ event

This event shall be triggered when at card insertion the recording equipment detects that, the previous card session has not been correctly closed (the card has been withdrawn before all relevant data have been stored on the card). This event shall be triggered by driver and workshop cards only.

5.7.7 ‘Over speeding’ event

This event shall be triggered for each over-speeding. This requirement shall apply only to vehicles falling within category M2, M3, N2 or N3.

5.7.8 ‘Power supply interruption’ event

This event shall be triggered, while not in calibration mode, in case of any interruption exceeding 200 milliseconds of the power supply of the motion sensor and/or of the vehicle unit. The interruption threshold shall be defined by the manufacturer. The drop in power supply due to the starting of the engine of the vehicle shall not trigger this event.

5.7.9 ‘Motion data error’ event

This event shall be triggered in case of interruption of the normal data flow between the motion sensor and the vehicle unit and/or in case of data integrity or data authentication error during data exchange between the motion sensor and the vehicle unit.

5.7.10 Vehicle Motion Conflict’ event

This event shall also be triggered when a zero speed measurement is contradicted by motion information from at least one independent source for more than one uninterrupted minute.

In cases where the vehicle unit can receive or elaborate speed values from external independent source of motion information, this event may also be triggered if such speed values significantly contradict those elaborated from the motion sensor speed signal for more than one minute.

5.7.11 ‘Security breach attempt’ event

This event shall be triggered for any other event affecting the security of the motion sensor and/or of the vehicle unit as specified within the generic security targets of these components, while not in calibration mode.

5.7.12 ‘Card’ fault

This fault shall be triggered when a tachograph card failure occurs during operation.

5.7.13 ‘Recording equipment’ fault

This fault shall be triggered for any of these failures, while not in calibration mode:

- (a) VU internal fault,
- (b) printer fault,
- (c) display fault,
- (d) downloading fault,
- (e) sensor fault.”

20 Page No 24/33, Clause No. 5.8

Substitute following text for existing text

5.8 Built-in and self-tests

The recording equipment shall self-detect faults through self tests and built-in-tests, according to the following table:

Sub-assembly to test	Self test	Built-in-test
Software		Integrity
Data memory	Access	Access, data integrity
Card interface devices	Access	Access
Keyboard		Manual check
Printer	(up to manufacturer)	Printout
Display		Visual check
Downloading (performed only during downloading)	Proper operation	
Sensor	Proper operation	Proper operation

Substitute following text for existing text

“5.10 RECORDING AND STORING IN THE DATA MEMORY

For the purpose of this paragraph,

- (a) ‘365 days’ is defined as 365 calendar days of average drivers activity in a vehicle. The average activity per day in a vehicle is defined as at least six drivers or co-drivers, six card insertion withdrawal cycles, and 256 activity changes. ‘365 days’ therefore include at least 2 190 co-drivers, 2 190 card insertion withdrawal cycles, and 93 440 activity changes,
- (b) times are recorded with a resolution of one minute, unless otherwise specified,
- (c) odometer values are recorded with a resolution of one kilometre,
- (d) speeds are recorded with a resolution of 1 km/h.

Data stored into the data memory shall not be affected by an external power supply cut-off of less than twelve months in type approval conditions.

The recording equipment shall be able to record and store implicitly or explicitly in its data memory the following:

5.10.1 Equipment identification data

5.10.1.1 Vehicle unit identification data

The recording equipment shall be able to store in its data memory the following vehicle unit identification data:

- (a) name of the manufacturer,
- (b) address of the manufacturer,
- (c) part number,
- (d) serial number,
- (e) software version number,
- (f) software version installation date,
- (g) year of equipment manufacture,
- (h) approval number.

Vehicle unit identification data are recorded and stored once and for all by the vehicle unit (VU) manufacturer, except the software- related data and the approval number which may be changed in case of software upgrade.

5.10.1.2 **Motion sensor identification data**

The motion sensor shall be able to store in its memory the following identification data:

- (a) name of the manufacturer,
- (b) part number,
- (c) serial number,
- (d) approval number,
- (e) embedded security component identifier (e.g. internal chip/processor part number),
- (f) operating system identifier (e.g. software version number).

Motion sensor identification data are recorded and stored once and for all in the motion sensor, by the motion sensor manufacturer.

The vehicle unit shall be able to record and store in its data memory the following currently paired motion sensor identification data:

- (a) serial number,
- (b) approval number,
- (c) first pairing date.

5.10.2 **Security elements**

5.10.2.1 The recording equipment shall be able to store the following security elements:

- (a) public key,
- (b) State certificate,
- (c) equipment certificate,
- (d) equipment private key.

Recording equipment security elements are inserted in the equipment by the vehicle unit manufacturer.

5.10.3 **Driver card insertion and withdrawal data**

5.10.3.1 For each insertion and withdrawal cycle of a driver or workshop card in the equipment, the recording equipment shall record and store in its data memory:

- (a) the card holder's surname and first name(s) as stored in the card,
- (b) the card's number, issuing State and expiry date as stored in the card,
- (c) the insertion date and time,
- (d) the vehicle odometer value at card insertion,
- (e) the slot in which the card is inserted,
- (f) the withdrawal date and time,

- (g) the vehicle odometer value at card withdrawal,
- (h) the following information about the previous vehicle used by the driver, as stored in the card:
 - i. VRN and registering State,
 - ii. card withdrawal date and time,
- (i) a flag indicating whether, at card insertion, the card holder has manually entered activities or not.

5.10.3.2 The data memory shall be able to hold these data for at least 365 days.

When storage capacity is exhausted, new data shall replace oldest data.

5.10.4 **Driver activity data**

5.10.4.1 The recording equipment shall record and store in its data memory whenever there is a change of activity for the driver and/or the co- driver, and/or whenever there is a change of driving status, and/or whenever there is an insertion or withdrawal of a driver or workshop card:

- (a) the driving status (CREW, SINGLE),
- (b) the slot (DRIVER, CO-DRIVER),
- (c) the card status in the relevant slot (INSERTED, NOT INSERTED) (see Note),
- (d) the activity (DRIVING, AVAILABILITY, WORK, BREAK/ REST),
- (e) the date and time of the change.

Note: INSERTED means that a valid driver or workshop card is inserted in the slot. NOT INSERTED means the opposite, i.e. no valid driver or workshop card is inserted in the slot (e.g. a company card is inserted or no card is inserted).

Note: Activity data manually entered by a driver are not recorded in the data memory.

5.10.4.2 The data memory shall be able to hold driver activity data for at least 365 days.

5.10.4.3 When storage capacity is exhausted, new data shall replace oldest data.

5.10.5 **Places where daily work periods start and/or end**

5.10.5.1 The recording equipment shall record and store in its data memory whenever a (co-)driver enters the place where a daily work period begins and/or ends:

- (a) if applicable, the (co-)driver card number and card issuing State,
- (b) the date and time of the entry (or the date/time related to the entry when the entry is made during the manual entry procedure),
- (c) the type of entry (begin or end, condition of entry),
- (d) region entered,
- (e) the vehicle odometer value.

5.10.5.2 The data memory shall be able to hold daily work periods start and/or end data for at least 365 days (with the assumption that one driver enters two records per day).

5.10.5.3 When storage capacity is exhausted, new data shall replace oldest data.

5.10.6 **Odometer data**

5.10.6.1 The recording equipment shall record in its data memory the vehicle odometer value and the corresponding date at midnight every calendar day.

5.10.6.2 The data memory shall be able to store midnight odometer values for at least 365 calendar days.

5.10.6.3 When storage capacity is exhausted, new data shall replace oldest data.

5.10.7 **Detailed speed data**

The recording equipment shall record and store in its data memory the instantaneous speed of the vehicle and the corresponding date and time at every second of at least the last 24 hours that the vehicle has been moving.

5.10.8 **Events data**

For the purpose of this subparagraph, time shall be recorded with a resolution of one second.

The recording equipment shall record and store in its data memory the following data for each event detected according to the following storage rules:

Event	Storage rules	Data to be recorded per event
Card conflict	- the 10 most recent events.	<ul style="list-style-type: none"> - date and time of beginning of event, - date and time of end of event, - cards' type, number and issuing State of the two cards creating the conflict.
Driving without an appropriate card	<ul style="list-style-type: none"> - the longest event for each of the 10 last days of occurrence, - the five longest events over the last 365 days. 	<ul style="list-style-type: none"> - date and time of beginning of event, - date and time of end of event, - cards' type, number and issuing State of any card inserted at beginning and/or end of the event, - number of similar events that day.
Card insertion while driving	- the last event for each of the 10 last days of occurrence.	<ul style="list-style-type: none"> - date and time of the event, - card's type, number and issuing State, - number of similar events that day.

Last card session not correctly closed	<ul style="list-style-type: none"> - the 10 most recent events. 	<ul style="list-style-type: none"> - date and time of card insertion, - card's type, number and issuing State, - last session data as read from the card: - date and time of card insertion, - VRN and State of registration.
Over speeding ⁽¹⁾	<ul style="list-style-type: none"> - the most serious event for each of the 10 last days of occurrence (i.e. the one with the highest average speed), - the five most serious events over the last 365 days. - the first event having occurred after the last calibration. 	<ul style="list-style-type: none"> - date and time of beginning of event, - date and time of end of event, - maximum speed measured during the event, - arithmetic average speed measured during the event, - card's type, number and issuing State of the driver (if applicable), - number of similar events that day.
Power supply interruption ⁽²⁾	<ul style="list-style-type: none"> - the longest event for each of the 10 last days of occurrence, - the five longest events over the last 365 days. 	<ul style="list-style-type: none"> - date and time of beginning of event, - date and time of end of event, - cards' type, number and issuing State of any card inserted at beginning and/or end of the event, - number of similar events that day.
Motion data error	<ul style="list-style-type: none"> - the longest event for each of the 10 last days of occurrence, - the five longest events over the last 365 days. 	<ul style="list-style-type: none"> - date and time of beginning of event, - date and time of end of event, - cards' type, number and issuing State of any card inserted at beginning and/or end of the event, - number of similar events that day.
Vehicle Motion Conflict	<ul style="list-style-type: none"> - the longest event for each of the 10 last days of occurrence, - the 5 longest events over the last 365 days. 	<ul style="list-style-type: none"> - date and time of beginning of event, - date and time of end of event, - cards' type, number and issuing State of any card inserted at beginning and/or end of the event, - number of similar events that day.
Security breach attempt	<ul style="list-style-type: none"> - the 10 most recent events per type of event. 	<ul style="list-style-type: none"> - date and time of beginning of event, - date and time of end of event (if

		relevant), - cards' type, number and issuing State of any card inserted at beginning and/or end of the event, - type of event.
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⁽¹⁾ The recording equipment shall also record and store in its data memory:

- the date and time of the last OVER SPEEDING CONTROL,
- the date and time of the first over speeding following this OVER SPEEDING CONTROL,
- the number of over speeding events since the last OVER SPEEDING CONTROL.

⁽²⁾ These data may be recorded at power supply reconnection only; times may be known with an accuracy to the minute.

5.10.9 **Faults data**

For the purpose of this subparagraph, time shall be recorded with a resolution of one second.

The recording equipment shall attempt to record and store in its data memory the following data for each fault detected according to the following storage rules:

Fault	Storage rules	Data to be recorded per event
Card fault	- the 10 most recent driver card faults.	- date and time of beginning of fault, - date and time of end of fault, - card's type number and issuing State.
Recording equipment faults	- the 10 most recent faults for each type of fault, - the first fault after the last calibration.	- date and time of beginning of fault, - date and time of end of fault, - type of fault, - cards' type, number and issuing State of any card inserted at beginning and/or end of the fault.

5.10.10 **Calibration data**

5.10.10.1 The recording equipment shall record and store in its data memory data relevant to:

- (a) known calibration parameters at the moment of activation,
- (b) its very first calibration following its activation,
- (c) its first calibration in the current vehicle (as identified by its VIN),
- (d) the five most recent calibrations (If several calibrations happen within one calendar day, only the last one of the day shall be stored).

- 5.10.10.2 The following data shall be recorded for each of these calibrations:
- (a) purpose of calibration (activation, first installation, installation, periodic inspection),
 - (b) workshop name and address,
 - (c) workshop card number, card issuing State and card expiry date,
 - (d) vehicle identification,
 - (e) parameters updated or confirmed: w, k, l, tyre size, speed limiting device setting, odometer (old and new values), date and time (old and new values).

5.10.10.3 The motion sensor shall record and store in its memory the following motion sensor installation data:

- (a) first pairing with a VU (date, time, VU approval number, VU serial number),
- (b) last pairing with a VU (date, time, VU approval number, VU serial number).

5.10.11 **Time adjustment data**

5.10.11.1 The recording equipment shall record and store in its data memory data relevant to:

- (a) the most recent time adjustment,
- (b) the five largest time adjustments, since last calibration, performed in calibration mode outside the frame of a regular calibration (definition).

5.10.11.2 The following data shall be recorded for each of these time adjustments:

- (a) date and time, old value,
- (b) date and time, new value,
- (c) workshop name and address,
- (d) workshop card number, card issuing State and card expiry date.

5.10.12 **Control activity data**

5.10.12.1 The recording equipment shall record and store in its data memory the following data relevant to the 20 most recent control activities:

- (a) date and time of the control,
- (b) control card number and card issuing State,
- (c) type of the control (displaying and/or printing and/or VU downloading and/or card downloading).

5.10.12.2 In case of downloading, the dates of the oldest and of the most recent days downloaded shall also be recorded.

5.10.13 **Company locks data**

The recording equipment shall record and store in its data memory the following data relevant to the 255 most recent company locks:

- (a) lock-in date and time,
- (b) lock-out date and time,
- (c) Company Card number and card issuing States,
- (d) Company name and address.

Data previously locked by a lock removed from memory due to the limit above, shall be treated as not locked.

5.10.14 **Download activity data**

The recording equipment shall record and store in its data memory the following data relevant to the last data memory downloading to external media while in company or in calibration mode:

- (a) date and time of downloading,
- (b) company or workshop card number and card issuing State,
- (c) company or workshop name.

5.10.15 **Specific conditions data**

5.10.15.1 The recording equipment shall record in its data memory the following data relevant to specific conditions:

- (a) date and time of the entry,
- (b) type of specific condition.

5.10.15.2 The data memory shall be able to hold specific conditions data for at least 365 days (with the assumption that on average, one condition is opened and closed per day). When storage capacity is exhausted, new data shall replace oldest data.

22 Page No 29/33

Add new Clause No. 5.16 and its sub-clauses

5.16 **READING FROM TACHOGRAPH CARDS**

5.16.1 The recording equipment shall be able to read from tachograph cards, where applicable, the necessary data:

- (a) to identify the card type, the card holder, the previously used vehicle, the date and time of the last card withdrawal and the activity selected at that time,
- (b) to check that last card session was correctly closed,
- (c) to compute the driver's continuous driving time, cumulative break time and cumulated driving times for the previous and the current week,
- (d) to print requested printouts related to data recorded on a driver card,
- (e) to download a driver card to external media.

5.16.2 In case of a reading error, the recording equipment shall try again, three times maximum, the same read command, and then if still unsuccessful, declare the card faulty and non-valid.

Add new Clause No. 5.17 and its sub-clauses

- “5.17 RECORDING AND STORING ON TACHOGRAPH CARDS**
- 5.17.1 The recording equipment shall set the ‘card session data’ in the driver or workshop card right after the card insertion.
- 5.17.2 The recording equipment shall update data stored on valid driver, workshop and/or control cards with all necessary data relevant to the period while the card is inserted and relevant to the card holder.
- 5.17.3 The recording equipment shall update driver activity and location data (as specified in clause 5.10.4 and 5.10.5), stored on valid driver and/or workshop cards, with activity and location data manually entered by the cardholder.
- 5.17.4 The ‘Vehicle Motion Conflict’ event shall not be stored on the driver and workshop cards.
- 5.17.5 Tachograph cards data update shall be such that, when needed and taking into account card actual storage capacity, most recent data replace oldest data.
- 5.17.6 In the case of a writing error, the recording equipment shall try again, three times maximum, the same write command, and then if still unsuccessful, declare the card faulty and non valid.
- 5.17.7 Before releasing a driver card, and after all relevant data have been stored on the card, the recording equipment shall reset the card session data.”

Add new Clause No. 6.0 and its sub-clauses

- 6.0 INSTALLATION AND INSPECTION**
- 6.1 INSTALLATION AND REPAIR**
- 6.1.1 Tachographs shall be installed or repaired only by fitters, workshops or vehicle manufacturers approved by the competent authorities.
- 6.1.2 Approved fitters, workshops or vehicle manufacturers shall, in accordance with the specifications included in the type-approval certificate, seal the tachograph after having verified that it is functioning properly, and, in particular, in such a way as to ensure that no manipulation device can tamper with or alter the data recorded.
- 6.1.3 The approved fitter, workshop or vehicle manufacturer shall place a special mark on the seals which it affixes and, in addition, for digital tachographs, shall enter the electronic security data for carrying out authentication checks.
- The competent authorities shall send the register of the marks and electronic security data used and the necessary information related to the electronic security data used.
- 6.1.4 For the purpose of certifying that the installation of the tachograph took place in accordance with the requirements of this Standard, an installation

plaque shall be affixed in such a way as to be clearly visible and easily accessible.

- 6.1.5 Tachograph components shall be sealed as specified in the type-approval certificate. Any connections to the tachograph which are potentially vulnerable to tampering, including the connection between the motion sensor and the gearbox, and the installation plaque where relevant, shall be sealed.
- 6.1.6 A seal shall be removed or broken only:
- (a) by fitters or workshops approved by the competent authorities for repair, maintenance or recalibration purposes of the tachograph, or by control officers properly trained and, where required authorised, for control purposes;
 - (b) for the purpose of vehicle repair or modification which affects the seal. In such cases, a written statement stating the date and time at which the seal was broken and giving the reasons for the seal removal shall be kept on board the vehicle.
- 6.1.7 In all cases, the seals shall be replaced by an approved fitter or workshop without undue delay and at the latest within seven days of their removal.
- 6.1.8 Before replacing seals, a check and calibration of the tachograph shall be performed by an approved workshop.

6.2 INSPECTIONS OF TACHOGRAPHS

- 6.2.1 Tachographs shall be subject to regular inspection by approved workshops. Regular inspections shall be carried out at least every two years.
- 6.2.2 The inspections referred to in Clause 6.2.1 shall check at least the following:
- (a) the tachograph is correctly fitted and appropriate for the vehicle;
 - (b) the tachograph is working properly;
 - (c) the tachograph carries the type-approval mark;
 - (d) the installation plaque is affixed;
 - (e) all seals are intact and effective;
 - (f) there are no manipulation devices attached to the tachograph or traces of the use of such devices;
 - (g) the tyre size and the actual circumference of the tyres.
- 6.2.3 Workshops shall draw up an inspection report in cases where irregularities in the functioning of the tachograph had to be remedied, whether as a result of a periodic inspection or of an inspection carried out at the specific request of the national competent authority. They shall keep a list of all inspection reports drawn up.
- 6.2.4 Inspection reports shall be retained for a minimum period of two years from the time the report was made. In cases where the inspection reports are kept by the workshop, upon request from the competent authority, the workshop shall make available the reports of inspections and calibrations carried out during that period.

Add new Clause No. 7.0 and its sub-clauses

“7.0 CORRECT USE OF TACHOGRAPHS

- 7.1 Digital tachographs shall not be set in such a way that they automatically switch to a specific category of activity when the vehicle’s engine or ignition is switched off, unless the driver remains able to choose manually the appropriate category of activity.
- 7.2 It shall be forbidden to falsify, conceal, suppress or destroy data stored in the tachograph or on the driver card. Any manipulation of the tachograph, driver card which could result in data being falsified, suppressed or destroyed shall also be prohibited. No device which could be used to this effect shall be present on the vehicle.”

Add new Clause No. 8.0 and its sub-clauses

“8.0 DRIVERS MANUAL ENTRIES

8.1 ENTRY OF PLACES WHERE DAILY WORK PERIODS BEGIN AND/OR END

- 8.1.1 This function shall allow for the entry of places where the daily work periods begin and/or end for a driver and/or a co-driver.
- 8.1.2 At the time of a driver (or workshop) card withdrawal, the recording equipment shall prompt the (co-)driver to enter a ‘place where the daily work period ends’.
- 8.1.3 It shall be possible to input places where daily work periods begin and/or end through commands in the menus. If more than one such input is done within one calendar minute, only the last begin place input and the last end place input done within that time shall be kept recorded.

8.2 MANUAL ENTRY OF DRIVER ACTIVITIES

- 8.2.1 Upon driver (or workshop) card insertion, and only at this time, the recording equipment shall allow manual entries of activities. It shall be possible to make manual entries, if required, at the first insertion of a previously unused driver (or workshop) card.
- 8.2.2 Manual entries of activities shall be performed using local time and date values of the time zone (UTC offset) currently set for the vehicle unit.
- 8.2.3 At driver or workshop card insertion the cardholder shall be reminded of:
 - (a) The date and time of his last card withdrawal.
 - (b) Optionally: the local time offset currently set for the vehicle unit
- 8.2.4 It shall be possible to input activities with the following restrictions:
 - (a) Activity type shall be WORK, AVAILABILITY or BREAK/REST.
 - (b) Start and end times for each activity shall be within the period of the last card withdrawal — current insertion only.

- 8.2.5 Activities shall not be allowed to overlap mutually in time.
- The procedure for manual entries of activities shall include as many consecutive steps as necessary to set a type, a start time and an end time for each activity. For any part of the time period between last card withdrawal and current card insertion, the cardholder shall have the option not to declare any activity.
- 8.2.6 During the manual entries associated with card insertion and if applicable, the card holder shall have the opportunity to input:
- (a) a place where a previous daily work period ended, associated to the relevant time (if not already entered at the last card withdrawal),
 - (b) a place where the current daily work period begins, associated to the relevant time,
- 8.2.7 If a location is entered, it shall be recorded in the relevant tachograph card. Manual entries shall be interrupted if:
- (a) the card is withdrawn or,
 - (b) the vehicle is moving and the card is in the driver slot.
- 8.2.8 Additional interruptions are allowed, e.g. a timeout after a certain period of user inactivity. If manual entries are interrupted, the recording equipment shall validate any complete place and activity entries (having either unambiguous place and time, or activity type, begin time and end time) already made.
- 8.2.9 If a second driver or workshop card is inserted while manual entries of activities are in progress for a previously inserted card, the manual entries for this previous card shall be allowed to be completed before manual entries start for the second card.
- 8.2.10 The cardholder shall have the option to insert manual entries according to the following minimum procedure:
- (a) Enter activities manually, in chronological order, for the period last card withdrawal – current insertion.
 - (b) Begin time of the first activity shall be set to card withdrawal time. For each subsequent entry, the start time shall be preset to immediately follow the end time of the previous entry. Activity type and end time shall be selected for each activity.
 - (c) The procedure shall end when the end time of a manually entered activity equals the card insertion time. The recording equipment may then optionally allow the card holder to modify any activity manually entered, until validation by selection of a specific command. Thereafter, any such modification shall be forbidden.'

8.3 ENTRY OF SPECIFIC CONDITIONS

- 8.3.1 The recording equipment shall allow the driver to enter, in real time, the following two specific conditions:
- (a) 'OUT OF SCOPE' (begin, end)
 - (b) 'FERRY / TRAIN CROSSING'

- 8.3.2 A 'FERRY / TRAIN CROSSING' may not occur if an 'OUT OF SCOPE' condition is opened.
- 8.3.3 An opened 'OUT OF SCOPE' condition shall be automatically closed, by the recording equipment, if a driver card is inserted or withdrawn.
- 8.3.4 An opened 'OUT OF SCOPE' condition shall inhibit the following events and warnings:
 - (a) Driving without an appropriate card,
 - (b) Warnings associated with continuous driving time.”

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Add following new ANNEXURE IV after existing ANNEXURE III

APPROVAL CERTIFICATE FOR DIGITAL TACHOGRAPHS

(Certificate to be issued for recording equipment model, recording equipment component, a driver's card, a workshop card, a company card, a controller's card)

1. Manufacturing brand or trademark
2. Name of model.....
3. Name of manufacturer.....
4. Address of manufacturer.....
5. Submitted for approval for.....
6. Laboratory(-ies)
7. Date and number of test report.....
8. Date of approval.....
9. Date of withdrawal of approval.....
10. Model of recording equipment(s) with which the component is designed to be used.....
11. Place.....
12. Date.....
13. Descriptive documents annexed.....
14. Remarks.....

(Signature)

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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLES RULES - TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

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AUTOMOTIVE INDUSTRY STANDARD

**Automotive Vehicles –
Recording Equipment in
Road Vehicles (Tachograph)**

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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES - TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF SHIPPING ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)

GOVERNMENT OF INDIA

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Status chart of the Standard to be used by the purchaser
for updating the record

Sr. No.	Corr-igenda.	Amend-ment	Revision	Date	Remark	Misc.

General Remarks:

INTRODUCTION

The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standard Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the secretariat of the AIS Committee, has published this standard. For better dissemination of this information ARAI may publish this document on their web site.

Automatic recording of vehicle's journey details such as speed and distance traveled will contribute significantly to road safety and will encourage sensible driving of the vehicle. The tachograph is precisely the recording equipment fitted in road vehicles capable of recording vehicle journey details for each driver. In order to finalise construction and functional requirements for tachograph for the purpose of type approval, a panel was constituted by AISC with ARAI as secretariat. The panel after deliberations finalised this AI standard in the present form.

While preparing this standard, considerable assistance has been taken from EEC Directive 3821/85 (Issue2, Dec. 2003) (as amended by 3314/90, 3572/90, 3688/92, 2479/95, 1056/97, 2135/98 and 1360/2002 and regulation EC No.1882/2002) on Recording equipment in road transport.

The Automotive Industry Standards Committee responsible for preparation of this standard is given in Annexure-V.

Automotive Vehicles – Recording Equipment in Road Vehicles (Tachograph)

1.0 SCOPE

This standard specifies the requirements and methods of tests of the recording equipment in road vehicles (Tachograph).

2.0 REFERENCES

- 2.1 IS: 10250-1982 " Specifications for Severities for Environmental Tests for Automotive Electrical Equipment"
- 2.2 IS: 9000 (Part V/Sec. 1 and 2) - 1981 "Basic Environmental Testing Procedures for Electronic and Electrical Items "
- 2.3 AIS-004/1999 : Electromagnetic Radiation from Automotive Vehicles – Permissible Levels and Method of Tests.

3.0 APPLICATION FOR TYPE APPROVAL

Applications for approval of a type of tachograph with a model record sheet/ memory card shall be submitted, accompanied by the appropriate specifications, by the manufacturer or his agent to the test agency.

Any modifications or additions to an approved model must receive additional type approval from the test agency which granted the original type approval.

The requirements for extension of type approval because of modification(s) in approved model are given in Annexure IV.

4.0 REQUIREMENT OF CONSTRUCTION, TESTING AND INSTALLATION

Tachograph shall satisfy the construction and installation requirement as given in Annexure I (Chart Type Tachograph) or Annexure II (Digital Tachograph), as applicable.

Note: Recording equipment in the standard has been referred as tachograph.

5.0 TESTS ON TACHOGRAPH

- 5.1 The tachograph may be approved when it meets the requirements of para 5.3, 5.4 , 5.5, 5.6 and 5.8 below.
- 5.2 Five samples of tachograph shall be submitted - four samples for the performance and endurance test described in para 5.3 and 5.4 below and one sample for EMI/EMC test. In the case of on-board system built in the vehicle, the involved system and its components shall be submitted separately for the performance and endurance tests.

5.3 Performance Tests

5.3.1 All the five samples shall be tested for performance as given below.

5.3.2 Visual Examination

The tachograph shall be visually examined for workmanship, finish, marking and general requirements as mentioned in Annexure I or Annexure II, as applicable.

5.3.3 Functional Test

The tachograph shall be connected to the rated voltage. The tachograph shall be coupled to a suitable test rig and tested for its functions as mentioned in Annexure I or Annexure II, as applicable. It shall meet the maximum tolerance requirements as given in cl. 4.0 of Annexure I and cl. 5.0 of Annexure II as applicable.

5.3.4 Operating Voltage Range

The tachograph shall operate satisfactorily over the following voltage range

Rated Voltage of Tachograph, V	Test Voltage Range, V	
	Maximum	Minimum
24	32	18
12	16	9

5.3.5 Protection Against Reverse Polarity

The tachograph shall be able to withstand polarity inversion for a minimum duration of 1 min without electrical damages apart from fuses (broken fuses may be changed). After the test, the tachograph shall work satisfactorily for its intended operations.

5.4 Endurance Test at Ambient Temperature

The tachograph should be mounted on a test bench simulating the vehicle conditions. The component should be tested for 500 h at an ambient temperature of $30^{\circ}\text{C} \pm 5^{\circ}\text{C}$ as follows

3 sec ON at min 80% of the full-scale speed range of the tachograph and 3 sec OFF. After the endurance test, the tachograph shall meet the maximum tolerance requirements as given in cl. 4.0 of Annexure I and cl. 5.0 of Annexure II as applicable.

5.5 Conditioning Tests

5.5.1 The device shall be subjected to the following conditions and meet the performance requirements as given in the cl. 5.3.3 after the conditioning.

5.5.2 Dry Heat Test

The component shall be subjected for 16 h in a chamber whose temperature is maintained at $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ as per cl. 4.2 of IS:10250-1982.

5.5.3 Cold Test

The component shall be subjected for 16 h in a chamber whose temperature is maintained at $-10^{\circ}\text{C} \pm 3^{\circ}\text{C}$ as per cl. 4.4 of IS:10250-1982.

5.5.4 Damp Heat (Cycling) Test

The component shall be subjected for 6 damp heat cycles in a chamber, whose environment is varied according to Damp Heat Cycle Test as per 1A Test Cycle of Variant 1 with upper temperature of 55°C of IS: 9000 (Part V/Sec. 2)-1981 (Fig.2).

5.5.5 Rapid Change of Temperature Test

The component shall be subjected for 5 cycles in a chamber whose temperature is varied between -10°C and 70°C described in Group 2 ,cl. 4.5 of IS: 10250-1982.

5.5.6 Vibration Test

The component shall be mounted on a table as per cl. 4.1 of IS: 10250-1982, and subjected to the following conditions of vibrations

- For Engine mounted components: In the frequency range of 10 Hz to 250 Hz with constant displacement of 0.75 mm up to a frequency of 57/62 Hz and a constant acceleration of 10 g above that frequency for 1 h in each axis for all the three axes.
- For Cabin mounted components: In the frequency range of 10-55 Hz, with constant displacement of 0.35 mm for 1 h in each axis for all the three axes.

5.5.7 Salt Spray Test

The components, exposed to the ambient road environment, shall be kept in a salt spray chamber with 5% concentration of sodium chloride and internal temperature of $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 50 h as per cl. 4.8 of IS: 10250-1982.

5.5.8 Dust Test

The unit should be conditioned as per cl. 4.6 of IS: 10250-1982.

5.5.9 Water Spray Test

The unit should be conditioned as per cl. 4.13 of IS: 10250-1982.

5.5.10 Bump Test

The complete device should be subjected to bump test as per cl. 4.11 of IS: 10250-1982.

5.6 EMI/EMC TEST

The tachograph shall meet the requirements of electro magnetic radiation levels as per AIS-004/1999. The tachograph shall be protected against battery power supply transient and shall comply with the requirements of ISO:7637-2. The tachograph shall be protected against electrostatic discharges and shall comply with the requirements of IEC: 61000 – 4 - 2, ± 2 kV (Level 1).

5.7 The distribution of the samples for the various tests is given below

Sr. No.	Test	Sample No.				
		1	2	3	4	5
1.	Endurance Tests	*				
2.	Conditioning Tests					
2.1	High Temperature		*			
2.2	Low Temperature		*			
2.3	Damp Heat Cycles		*			
2.4	Rapid Change of Temperature		*			
2.5	Vibration				*	
2.6	Salt Spray			*		
2.7	Dust			*		
2.8	Water Spray			*		
2.0	Bump				*	
3	EMI/EMC Tests					*

5.8 Performance Tests on the Device as Fitted on the Vehicle

5.8.1 The tachograph as installed on 3 vehicles shall comply with the following additional requirements

5.8.1.1 Tachograph Installation on Vehicle

The tachograph shall be provided with an installation plaque. The plaque shall bear at least the following details

- a) Name and Address of tachograph Manufacturer
- b) Tachograph Sl. No.
- c) Characteristic Coefficient of the Vehicle in the form $W = \dots$ Impulses/km
- d) Constant of the tachograph in the form $K = \dots$ impulses/km
- e) Effective Circumference of the Wheel Tyres in the form $L = \dots$ mm

The tachograph shall be mounted in the test vehicle and it shall be activated with appropriate entry of characteristic coefficient of the vehicle and tachograph constant.

5.8.1.2 Vehicle Preparation

The test vehicle shall be unladen in normal running order. The tyre pressure shall be as per the vehicle manufacturer's recommendation. The tyre wear shall be within the limits.

5.8.2 Characteristics of Test Track

The test shall be carried out on a roadway, smooth, dry and covered with asphalt or a similar material in a straight line. The roadway shall be capable of allowing the maximum speed to be maintained over a measuring strip minimum of 200m, established to the nearest one meter.

The measuring stretch of track shall have adequate length on either ends for the purpose of achieving the test speed and stopping the vehicle at the end of the trial.

Alternatively, suitable roller chassis dynamometer can be used for vehicle tests with necessary road load simulation.

5.8.3 Test Method

The test vehicles shall be driven at test speeds as given below

Maximum Speed of Test Vehicle as Declared by Vehicle Manufacturer (km/h)	Test Speed (km/h)
Up to 100 km/h	40 km/h and 80% of the maximum speed (rounded off to the nearest value divisible by 5)
More than 100 km/h	40km/h, 80km/h and 80% of maximum speed or 120 km/h whichever is lower.

The test instrumentation for measuring the true vehicle speed shall be accurate within $\pm 0.5\%$.

The test vehicle shall be driven till a steady speed of 50 ± 2 km/h is achieved and at this speed the vehicle shall be driven for at least 10 km.

5.8.4 Acceptance Criteria for Test

The tachograph when tested as per the above test method shall comply with the maximum tolerance requirement as per cl. 4.0 of Annexure I and 5.0 of Annexure II as applicable.

ANNEXURE I

(See 4.0)

REQUIREMENT FOR CONSTRUCTION, TESTING, INSTALLATION, AND INSPECTION OF CHART TYPE TACHOGRAPH

1.0 DEFINITIONS

In this Annexure

1.1 Recording Equipment (Tachograph) means

Equipment intended for installation in road vehicles to show and record automatically or semi-automatically details of the movement of those vehicles and of the certain working periods of their drivers;

1.2 Record Sheet means

A sheet designed to accept and retain recorded data, to be placed in the tachograph and on which the marking devices of the latter inscribe a continuous record of the information to be recorded;

1.3 The Constant of the Tachograph means

The numerical characteristic giving the value of the input signal required to show and record a distance traveled of one kilometer; this constant must be expressed either in revolutions per kilometer ($k = \dots \text{ rev/km}$), or in impulses per kilometer ($k = \dots \text{ imp/km}$);

1.4 Characteristic Coefficient of the Vehicle means

The numerical characteristic giving the value of the output signal emitted by the part of the vehicle linking it with the tachograph (gearbox output shaft or axle) while the vehicle travels a distance of one measured kilometer under normal test conditions. The characteristic coefficient is expressed either in revolutions per kilometer ($w = \dots \text{ rev/km}$) or in impulses per kilometer ($w = \dots \text{ imp/km}$);

1.5 Effective Circumference of Wheel Tyres means

The average of the distances traveled by the several wheels moving the vehicle (driving wheels) in the course of one complete rotation. The measurement of these distances must be made under normal test conditions and is expressed in the form: $L = \dots \text{ mm}$.

2.0 GENERAL CHARACTERISTICS AND FUNCTIONS OF TACHOGRAPH

The equipment must be able to record the following

- i) Distance traveled by the vehicle;
- ii) Speed of the vehicle;
- iii) Driving time;
- iv) Other periods of work or of availability;
- v) Breaks from work and daily rest periods;

vi) Opening of the case containing the record sheet. The equipment must have the facility to retrieve the record onboard and must be able to record distinctly in case of multi-driver operation the details of the periods listed under iii, iv and v.

vii) Driver's Identity

The equipment must be capable of recording on sheets details of the periods listed under iii, iv and v for at least one driver and for two drivers as option.

viii) For electronic recording equipment (tachograph), which is equipment operating by electrical signals transmitted from the distance and speed sensor, any interruption exceeding 100 milli second, in the power supply of the recording equipment (except lighting), in the power supply of the distance and speed sensor and any interruption in the signal lead to the distance and speed sensor.

3.0 CONSTRUCTION REQUIREMENTS FOR TACHOGRAPH

3.1 Tachograph shall include the following

3.1.1 Visual instruments showing

- a) Distance traveled (Odometer),
- b) Speed (speedometer),
- c) Time (clock).

3.1.2 Recording instruments comprising

- a) A recorder of the distance traveled,
- b) A speed recorder,
- c) One or more time recorders
- d) Driver's Identity

3.1.3 A means of marking showing on the record sheet individually

- a) Each opening of the case containing that sheet
- b) For electronic recording equipment, any interruption exceeding 100 ms in the power supply of the recording equipment (except lighting), not latter than at switching on the power supply again,
- c) For electronic equipment any interruption exceeding 100 ms in the power supply of the distance and speed sensor and any interruption in the signal lead to the distance and speed sensor.

3.1.4 Any inclusion in the equipment of the devices additional to those listed above must not interfere with the proper operation of the mandatory devices or with the reading of them.

The equipment must be submitted for approval complete with any such additional devices.

3.2. Materials

- 3.2.1 All the constituent parts of the tachograph must be made of materials with sufficient stability and mechanical strength and stable electrical and magnetic characteristics.
- 3.2.2. Any modification in a constituent part of the equipment or in the nature of the materials used for its manufacture must, before being applied in manufacture, be submitted for approval to the authority, which granted type-approval for the equipment.

3.3 Measurement of distance traveled

The distances traveled may be measured and recorded either

- So as to include forward and reverse movement or forward only.

Any recording of reversing movements must on no account affect the clarity and accuracy of the other recordings.

3.4 Measurement of speed

- 3.4.1 The range of speed measurement shall be as stated in the type approval certificate.
- 3.4.2 The natural frequency and the damping of the measuring device must be such that the instruments showing and recording the speed can, within the range of measurement, follow acceleration changes of up to 2 m/s^2 and deceleration changes up to 5 m/s^2 within the limits of accepted tolerances.

3.5 Measurement of time (clock)

- 3.5.1 The control of the mechanism for resetting the clock must be located inside a case containing the record sheet; each opening of that case must be automatically recorded on the record sheet. Any resetting of the clock must be automatically recorded
- 3.5.2 If the forward movement mechanism of the record sheet is controlled by the clock, the period during which the latter will run correctly after being fully wound must be greater by at least 10 % than the recording period corresponding to the maximum sheet-load of the equipment.

3.6 Lighting and Protection

- 3.6.1 The visual instruments of the equipment must be provided with adequate non-dazzling lighting.
- 3.6.2 For normal conditions of use, all the internal parts of the equipment must be protected against damp and dust. In addition they must be made proof against tampering by means of casings capable of being sealed.

3.7 Visual instruments

- i) Distance traveled indicator (distance recorder)
- ii) The value of the smallest grading on the instrument showing distance traveled must be 0.1 kilometers. Figures showing hectometers must be clearly distinguishable from those showing whole kilometers.
- iii) The figures on the distance recorder must be clearly legible and must have an apparent height of at least 4 mm.
- iv) The distance recorder must be capable of reading up to at least 99 999.9 kilometers.

3.8 Speed indicators (speedometer)

- i) Within the range of measurement, the speed scale must be uniformly graduated by 1, 2, 5 or 10 kilometers per hour. The value of a speed graduation (space between two successive marks) must not exceed 10 % of the maximum speed shown on the scale.
- ii) The length of each space on the scale representing a speed difference of 10 kilometers per hour must not be less than 10 millimeters.
- iii) On an indicator with a needle, the distance between the needle and the instrument face must not exceed three millimeters.

3.9 Time indicator (clock)

The time indicator must be visible from outside the equipment and give a plain and unambiguous reading.

3.10 Recording instrument

3.10.1 **General Points:** All equipment, whatever the form of the record sheet (strip or disc) must be provided with a mark enabling the record sheet to be inserted correctly, in such a way as to ensure that the time shown by the clock and the time-marking on the sheet correspond.

3.10.2 The mechanism moving the record sheet must be such as to ensure that the latter moves without play and can be freely inserted and removed.

3.10.3 For record sheets in disc form, the forward movement device must be controlled by the clock mechanism. In this case, the rotating movement of the sheet must be continuous and uniform, with a minimum speed of seven millimeters per hour measured at the inner border of the ring marking the edge of the speed recording area.

In equipment of the strip type, where the forward movement device of the sheets is controlled by the clock mechanism the speed of rectilinear forward movement must be at least 10 millimeters per hour.

3.10.4 Recording of the distance traveled, of the speed of the vehicle and of any opening of the case containing the record sheet or sheets must be automatic.

3.10.5 Recording distance traveled

3.10.5.1 Every kilometer of distance traveled must be represented on the record by a variation of at least one millimeter on the corresponding coordinate.

3.10.5.2 Even at speeds reaching the upper limit of the range of measurement, the record of distances must still be clearly legible.

3.10.6 Recording speed

3.10.6.1 Whatever the form of the record sheet, the speed recording stylus must normally move in a straight line and at right angles to the direction of travel of the record sheet.

However, the movement of the stylus may be curvilinear, provided the following conditions are satisfied

a) The trace drawn by the stylus must be perpendicular to the average circumference (in the case of sheets in disc form) or to the axis (in the case of sheets in strip form) of the area reserved for speed recording,

b) The ratio between the radius of curvature of the trace drawn by the stylus and the width of the area reserved for speed recording must be not less than 2.4 to 1 whatever the form of the record sheet,

c) The markings on the time-scale must cross the recording area in a curve of the same radius as the trace drawn by the stylus. The spaces between the markings on the timescale must represent a period not exceeding one hour.

3.10.6.2 Each variation in speed of 10 kilometers per hour must be represented on the record by a variation of at least 1.5 millimeters on the corresponding coordinate.

3.10.7 Recording time

3.10.7.1 Tachograph must be so constructed that the period of the driving time is always recorded automatically and that it is possible, through the operation where necessary of a switch device to record separately the other periods of time.

3.10.7.2 It must be possible, from the characteristics of the traces, their relative positions to distinguish clearly between the various periods of time.

The various periods of time should be differentiated from one another on the record by differences in the thickness of the relevant traces, or by any other system of at least equal effectiveness from the point of view of legibility and ease of interpretation of the record.

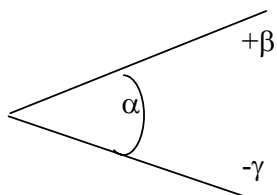
3.10.7.3 In the case of vehicles with a crew consisting of more than one driver, the recordings provided for cl. 3.10.7.1 must be made on two separate sheets, each sheet being allocated to one driver. In this case, the forward movement of the separate sheets must be effected either by a single mechanism or by separate synchronized mechanisms.

3.10.8 Closing device

- i) The case containing the record sheet or sheets and the control of the mechanism for resetting the clock must be provided with a lock.
- ii) Each opening of the case containing the record sheet or sheets and the control of the mechanism for resetting the clock must be automatically recorded on the sheet or sheets.

3.10.9 Markings

- i) The following markings must appear on the instrument face of the equipment
 - close to the figure shown by the distance recorder, the unit of measurement of distance, indicated by the abbreviation 'km',
 - Near the speed scale, the marking 'km/h',
 - The measurement range of the speedometer in the form 'V min . . . km/h, V max . . . km/h', This marking is not necessary if it is shown on the descriptive plaque of the equipment.
- ii) The descriptive plaque must be built into the equipment and must show the following markings, which must be visible on the equipment when installed
 - Name and address of the manufacturer of the equipment,
 - Manufacturer's serial number and year of construction, Equipment type/ model name
 - The constant of the equipment in the form 'k = . . . rev/km' or 'k = . . . imp/km',
 - Optionally, the range of speed measurement, in the form indicated in point 1,
 - Should the sensitivity of the instrument to the angle of inclination be capable of affecting the readings given by the equipment beyond the permitted tolerances, the permissible angle expressed as



Where α is the angle measured from the horizontal position of the front face (fitted the right way up) of the equipment for which the instrument is calibrated, while β and γ represent respectively the maximum permissible upward and downward deviations from the angle of calibration α .

4.0 Maximum Tolerances (visual and recording instruments)

4.1 On the test bench before installation

- (a) Distance traveled:
1 % more or less than the real distance, where that distance is at least one kilometer;
- (b) speed:
3 km/h more or less than the real speed;
- (c) Time:
± two minutes per day with a maximum of 10 minutes per seven days in cases where the running period of the clock after rewinding is not less than that period.

4.2 On installation

- (a) Distance traveled:
2 % more or less than the real distance, where that distance is at least one kilometer;
- (b) Speed:
4 km/h more or less than the real speed;
- (c) Time:
± two minutes per day, or
± 10 minutes per seven days.

- 4.3 The above tolerances apply for the lab testing as a component and type testing in as installation condition.
- 4.4. The maximum tolerances set out in cl. 4.1 and 4.2 are valid for temperatures between 0° and 40°C, temperatures being taken in close proximity to the equipment.
- 4.5. Measurement of the maximum tolerances set out in cl. 4.2 shall take place under the conditions laid.

5.0 RECORD SHEETS

- 5.1 The record sheets must be such that they do not impede the normal functioning of the instrument and that the records, which they contain, are indelible and easily legible and identifiable. The record sheets must retain their dimensions and any records made on them under normal conditions of humidity and temperature.

In addition it must be possible to write on the sheets, without damaging them and without affecting the legibility of the recordings.

Under normal conditions of storage, the recordings must remain clearly legible for at least one year.

- 5.2 The minimum recording capacity of the sheets, whatever their form, must be 24 hours.

If several discs are linked together to increase the continuous recording capacity which can be achieved without intervention by staff, the links between the various discs must be made in such a way that there are no breaks in or overlapping of recordings at the point of transfer from one disc to another.

5.2 Recording areas and their graduation

- 5.2.1 The record sheets shall include the following recording areas

- An area exclusively reserved for data relating to speed,
- An area exclusively reserved for data relating to distance traveled,
- One or more areas for data relating to driving time, to other periods of work and availability to breaks from work and to rest periods for drivers.

The area for recording speed must be scaled off in divisions of 20 kilometers per hour or less. The speed corresponding to each marking on the scale must be shown in figures against that marking. The symbol 'km/h' must be shown at least once within the area. The last marking on the scale must coincide with the upper limit of the range of measurement.

- 5.2.2 The area for recording distance traveled must be set out in such a way that the number of kilometers traveled may be read without difficulty.

The area or areas reserved for recording the periods referred to in point 1 must be so marked that it is possible to distinguish clearly between the various periods of time.

5.3 Information to be printed on the record sheets

Each sheet must bear, in printed form, the following information

- a) Name and address or trade name of the manufacturer,
- b) Approval mark for the model of the sheet,
- c) Approval mark for the type or types of equipment in which the sheet may be used,
- d) Upper limit of the speed measurement range, printed in kilometers per hour.

By way of minimal additional requirements, each sheet must bear, in printed form a time-scale graduated in such a way that the time may be read directly at intervals of fifteen minutes while each five minute interval may be determined without difficulty.

5.4 Free space for hand written insertions

A free space must be provided on the sheets such that drivers may as a minimum write in the following details

- Surname and first name of the driver,
- Date and place where use of the sheet begins and date and place where such use ends,
- The registration number or numbers of the vehicle or vehicles to which the driver is assigned during the use of the sheet,
- Odometer readings from the vehicle or vehicles to which the driver is assigned during the use of the sheet,
- The time at which any change of vehicle takes place.

6.0 INSTALLATION OF TACHOGRAPH

- 6.1. Tachograph must be positioned in the vehicle in such a way that the driver has a clear view from his seat of speedometer, distance recorder and clock while at the same time all parts of those instruments, including driving parts, are protected against accidental damage.
- 6.2. It must be possible to adapt the constant of the tachograph to the characteristic coefficient of the vehicle by means of a suitable device, to be known as an adaptor.
Vehicles with two or more rear axle ratios must be fitted with a switch device whereby these various ratios may be automatically brought into line with the ratio for which the equipment has been adapted to the vehicle.
- 6.3. After the equipment has been checked on installation, an installation plaque shall be affixed to the vehicle beside the equipment or in the equipment itself and in such a way as to be clearly visible.
- 6.4. The equipment shall, furthermore, be so designed that it is possible, without opening the case, to verify that recordings are being made.
- 6.5. In order to ensure that tachograph functions reliable and correctly, it is advisable that the competent authorities lay down uniform requirements for the periodic checks and inspections and sealing to which the equipment is to be subjected after installation. It is also advisable that the competent authorities define the responsibilities of drivers and fleet owners.

ANNEXURE II

(See 4.0)

REQUIREMENT FOR CONSTRUCTION, TESTING, INSTALLATION, AND
INSPECTION OF ELECTRONIC DIGITAL TACHOGRAPH**1.0 DEFINITIONS****In this Annexure****1.1 “Activation” means**

phase where the tachograph become fully operational and implants all functions, including security functions;

1.2 “Authentication” means

a function intended to establish and verify a claimed identity;

1.3 “Authenticity” means

the property that an information is coming from a party whose identity can be verified;

1.4 “Built-in-test (BIT)” means

tests run at request, triggered by the operator or by an external equipment;

1.5 “Calendar day” means

a day ranging from 00.00 hours to 24.00 hours. All calendar days relate to IST time

1.6 “Calibration” means

updating or confirming vehicle parameters to be held in the data memory. Vehicle parameters include vehicle identification and vehicle characteristics (w. k, l, tyre size, speed limiting device setting (if applicable), current IST time, current odometer value);

1.7 “Card number” means

a 16 alpha-numerical character number that uniquely identifies a tachograph card

1.8 “Card consecutive index” means

the 14th alpha-numerical character of a card number that is used to differentiate the different cards issued to a company or a body entitled to be issued several tachograph cards. The company or the body is uniquely identified by the 13 first characters of the card number;

- 1.9 **“Card renewal index” means**
the 16th alpha-numerical character of a card number, which is incremented each time a tachograph card is renewed;
- 1.10 **“Card replacement index” means**
the 15th alpha-numerical character of a card number which is incremented each time a tachograph card replaced.
- 1.11 **“Characteristics coefficient of the vehicle” means**
the numerical characteristic giving the value of the output signal emitted by the part of the vehicle linking it with the tachograph (gearbox output shaft or axle) while the vehicle travels a distance of one kilometer under standard test conditions.
The characteristic coefficient is expressed in impulses per kilometer ($w = \dots \text{ Imp/km}$);
- 1.12 **“Company card” means**
a tachograph card issued by the authorities to the owner or holder of vehicles fitted with tachograph;
the company card identifies the company and allows for displaying, downloading and printing of the data stored in the tachograph which has been locked by this company;
- 1.13 **“Constant of the Tachograph” means**
the numerical characteristics giving the value of the input signal required to show and record a distance traveled of one kilometer; this constant shall be expressed in impulses per kilometer ($k = \dots \text{ Imp/km}$);
- 1.14 **“Data memory” means**
an electronic data storage device built into the tachograph;
- 1.15 **“Downloading” means**
copying together with digital signature of a part or of a complete set of data stored in the data memory of the vehicle or in the memory of a tachograph card; downloading may not alter or delete any stored data;
- 1.16 **“Driver card” means**
a tachograph card issued by the authorities to a particular driver;
the driver card identifies the driver and allows for storage of driver activity data;

- 1.17 **“Effective circumference of the wheel tyres” means**
the average of the distances traveled by each of the wheels moving the vehicle (driving wheels) in the course of one complete rotation. The measurement of these distances shall be made under standard test conditions and is expressed in the form “I = ... mm”. Vehicle manufacturers may replace the measurement of these distances by a theoretical calculation which takes into account the distribution of the weight on the axles, vehicle unladen in normal running order. The methods for such theoretical calculation will be approved by a competent authority.
- 1.18 **“Event” means**
abnormal operation detected by the tachograph, which may come from a fraud attempt;
- 1.19 **“Fault” means**
abnormal operation detected by the tachograph, which may come from an equipment malfunction or failure;
- 1.20 **“Installation” means**
mounting of the tachograph in a vehicle;
- 1.21 **“Speed sensor” means**
part of the tachograph, providing a signal representative of vehicle speed and/or distance traveled;
- 1.22 **“Non valid card” means**
a card detected as faulty, or which initial authentication failed, or which start of validity date is not yet reached, or which date has passed;
- 1.23 **“Over speeding” means**
exceeding the authorized speed of the vehicle, defined as any period of more than 60 seconds during which the vehicle’s measured speed exceeds the limit for setting the speed limitation device on the installation and use of speed limitation devices for certain categories of motor vehicles.
- 1.24 **“Printer” means;**
component of the tachograph which provides printouts of stored data;
- 1.25 **“Tachograph” means;**
the total equipment intended for installation in road vehicles to show, record and store automatically or semi-automatically details of the movement of such vehicle and of certain work periods their drivers;

- 1.26 **“Self test” means;**
tests run cyclically and automatically by the tachograph to detect faults;
- 1.27 **“Tachograph card ” means;**
smart card intended for use with the tachograph. Tachograph cards allow for identification by the tachograph of the identify (or identify group) of the cardholder and allow for data transfer and storage. A tachograph card may be of the following types;
- driver card
 - company card
- 1.28 **“Type approval” means;**
process to certify, that the tachograph (or component) or the tachograph card under investigation fulfils the requirements of this standard;
- 1.29 **“Tyre size” means;**
the designation of the dimensions of the tyres .
- 1.30 **“Vehicle identification” means**
number identifying the vehicle: vehicle registration number (VRN) with indication of the registering authority and vehicle identification number (VIN).
- 1.31 **“Vehicle unit (VU)”means**
the tachograph excluding the motion sensor and the cables connecting the motion sensor. The vehicle unit may either be a single unit or be several units distributed in the vehicle, as long as it complies with the security requirements of this regulation;
- 2.0 GENERAL CHARACTERISTICS AND FUNCTIONS OF THE TACHOGRAPH**
- Any vehicle fitted with the tachograph complying with the provisions of this Annexure must include a speed display and an odometer. These functions may be included within the tachograph.
- 2.1 General Characteristics**
- 2.1.1 The purpose of the tachograph is to record, store, display and output data related to driver activities.
- 2.1.2 The tachograph includes cables, a speed sensor, a vehicle unit and tachograph cards

- 2.1.3 The vehicle unit includes a processing unit, a data memory, a real time clock, smart card interface device, a printer (optional), a display, a visual warning, a downloading connector and facility for entry of user's inputs.

The tachograph may be connected to other devices through additional connectors.

- 2.1.4 Any inclusion in or connection to the tachograph of any function, devices, or devices, approved or otherwise, shall not interface with, or be capable of interfacing with, the proper and secure operation of the tachograph and the provisions of the standard.

- 2.1.5 Tachograph users identify themselves to the equipment via tachograph cards. The tachograph shall be provided with driver card(s) and a company card. The construction and functional requirements for tachograph cards are as per Annexure III.

- 2.1.6 The tachograph provides selective access rights to data and functions according to user's type and/or identity.

The tachograph records and stores data in its data memory and in tachograph cards.

2.2 Functions

The tachograph shall ensure the following functions;

- a) monitoring cards insertions and withdrawals,
- b) speed and distance measurement
- c) time measurement;
- d) monitoring driver activities,
- e) monitoring driving status,
- f) detection of events and/or faults,
- g) built-in self tests,
- h) reading from data memory,
- i) recording and storing in data memory,
- j) reading from tachograph cards,
- k) recording and storing in tachograph cards,
- l) displaying,
- m) printing (optional),
- n) warning,
- o) data downloading to external media,
- p) output data to additional external devices,
- q) time adjustment.

3.0 Modes of Operation

The tachograph shall operate in the following modes of operation;

- a) operational mode,
- b) company mode,

The tachograph shall ignore non-valid cards inserted, except displaying, printing or downloading data held on an expired card, which shall be possible.

4.0 Security

The system security aims at protecting the data memory in such a way as to prevent unauthorized access to and manipulation of the data and detecting any such attempts, protecting the integrity and authenticity of data exchanged between the speed sensor and the vehicle unit, protecting the integrity and authenticity of data exchanged between the tachograph and the tachograph cards, and verifying the integrity and authenticity of data download.

5.0 CONSTRUCTION AND FUNCTIONAL REQUIREMENTS FOR TACHOGRAPH

5.1 Monitoring Cards Insertion and Withdrawal

The tachograph shall monitor the card interface devices to detect card insertions and withdrawals.

Upon card insertion the tachograph shall detect whether the card inserted is a valid tachograph card and in such a case identify the card type.

The tachograph shall be so designed that the tachograph cards are locked in position on their proper insertion into the card interface devices.

The release of tachograph cards may function only when the vehicle is stopped and after the relevant data has been stored on the cards. The release of the card shall require positive action by the user.

5.2 Speed and Distance Measurement

This function shall continuously measure and be able to provide the odometer value corresponding to the total distance traveled by the vehicle.

This function shall continuously measure and be able to provide the speed of the vehicle.

The speed measurement function shall also provide the information whether the vehicle is moving or stopped. The vehicle shall be considered as moving as soon as the function detects more than 1 imp/sec for at least five seconds from the speed sensor, otherwise the vehicle shall be considered as stopped.

Devices displaying speed (speedometer) and total distance traveled (odometer) installed in any vehicle fitted with a tachograph complying with the provisions of this Standard, shall comply with the requirements of maximum tolerances specified in cl. 5.3 and 5.4 below

5.3 Measurement of Distance Traveled

The distance traveled shall be measured so as to cumulate both forward and reverse movements.

The tachograph shall measure distance from 0 to 9,99,999.9 km

Distance measured for a test distance of min 10 km, shall be within the tolerances as given below

- a) $\pm 1\%$ on test bench
- b) $\pm 2\%$ on installation in vehicle

Distance measured shall have a resolution better than or equal to 0.1 km.

5.4 Measurement of Speed

The tachograph shall measure speed from 0 to 150 km/h.

Speed Measurement shall be within the tolerances as given below

- a) ± 1 km/h on test bench (at constant speed)
- b) ± 2 km/h on installation in vehicle

The speed shall be measured correctly within the normal tolerances within 2 seconds of the end of a change when the speed has changed at a rate up to 2 m/s^2 .

Speed measurement shall have a resolution better than or equal to 1 km/h.

5.5 Time Measurement

The time measurement function shall measure permanently and digitally provide IST date and time.

IST date and time shall be used for dating throughout the tachograph (recordings, printouts, data exchange, display...).

In order to visualize the local time, it shall be possible to change the offset of the time displayed, in half hour steps.

Time drift shall be within ± 2 seconds per day in type approval conditions.

Time measured shall have a resolution better than or equal to 1 second.

Time measured shall have the date format DD:MM:YYYY and time format HH:MM:SS.

Time measurement shall not be affected by an external power supply cut-off of less than 12 months in type approval conditions.

5.6 Monitoring Driver Activities

This function shall permanently monitor the activities of driver.

When the vehicle is moving, DRIVING shall be selected automatically for the driver.

When vehicle stops, STOP shall be selected automatically for the driver.

This function shall output activity changes to the recording functions at a resolution of one minute.

This function shall also permanently monitor the continuous driving time and the cumulative break time of the driver.

5.7 Detection of Events and / or Faults

This function shall detect the following events and / or faults

a) Insertion of a Non-valid Card Event

This event shall be triggered at the insertion of any non-valid card and / or when an inserted valid card expires.

b) "Time Overlap" Event

This event shall be triggered when the date / time of last withdrawal of a driver card, as read from the card; is later than the current date / time of the tachograph in which the card is inserted.

c) "Card Insertion while Driving" Event.

This event shall be triggered when a tachograph card is inserted in the slot, while driver activity is DRIVING,

d) "Over Speeding" Event

This event shall be triggered for each over speeding.

e) **“Power Supply Interruption” Event**

This event shall be triggered in case of any interruption exceeding 200 milliseconds of the power supply of the speed sensor and/or of the vehicle unit. The manufacturer shall define the interruption threshold. The drop in power supply due to the starting of the engine of the vehicle shall not trigger this event.

f) **“Speed Sensor Error” Event**

This event shall be triggered in case of interruption of the normal signal flow between the speed sensor and the vehicle unit and/or in case of data integrity or data authentication error during data exchange between the speed sensor and vehicle unit.

g) **“Security Breach Attempt” Event**

This event shall be triggered for any other event affecting the security of the speed sensor and/or of the vehicle unit as specified within the generic security targets of these components.

h) **“Card” Fault**

This fault shall be triggered when a tachograph card failure occurs during operation.

i) **“Tachograph” fault**

This fault shall be triggered for any of these failures

- VU internal fault,
- Printer fault,
- Display fault,
- Downloading fault,
- Sensor fault.

5.8 Built-in and Self Tests

The tachograph shall self-detect faults through self tests and built-in-tests, according to the manufacturer’s specifications.

5.9 Reading from Data Memory

The tachograph shall be able to read data stored in its data memory.

5.10 Recording and Storing in the Data Memory

For the purpose of this paragraph,

- a) times are recorded with a resolution of one minute,
- b) odometer values are recorded with a resolution of one kilometer,
- c) speeds are recorded with a resolution of 1 km/h.

Data stored into the data memory shall not be affected by an external power supply cut-off of less than twelve months in type approval conditions.

The tachograph shall be able to record and store implicitly or explicitly in its data memory the following

Equipment Identification Data

Vehicle Unit Identification Data

The tachograph shall be able to store in its data memory the following vehicle unit identification data

- a) name of the manufacturer,
- b) address of the manufacturer,
- c) part number,
- d) serial number,
- e) software version number,
- f) software version installation date,
- g) year of equipment manufacture,

Vehicle unit identification data are recorded and stored once and for all by the vehicle unit manufacturer, except the software-related data and the approval number which may be changed in case of software upgrade.

Speed Sensor Identification Data

The speed sensor shall be able to store in its memory the following identification data

- a) name of the manufacturer,
- b) part number,

Speed sensor identification data are recorded and stored once and for all in the tachograph, by the manufacturer.

Driver Card Insertion and Withdrawal Data

For each insertion and withdrawal cycle of a driver card in the equipment, the tachograph shall record and store in its data memory

- a) the card number and expiry date as stored in the card,
- b) the insertion date and time,
- c) the vehicle odometer value at card insertion,
- d) the withdrawal date and time,
- e) the vehicle odometer value at card withdrawal,

The data memory shall be able to hold these data for at least 365 days.

When storage capacity is exhausted, new data shall replace oldest data.

Driver Activity Data

The tachograph shall record and store in its data memory whenever there is a change of activity for the driver and/or whenever there is an insertion or withdrawal of a driver card

- a) the card status in the relevant slot (INSERTED, NOT INSERTED) (see Note),
- b) the activity (DRIVING, STOP)
- c) the date and time of the change.

Note: INSERTED means that a valid driver card is inserted in the slot. NOT INSERTED means the opposite, i.e. no valid driver card is inserted in the slot (e.g. a company card is inserted or no card is inserted).

The data memory shall be able to hold driver activity data for at least 365 days.

When storage capacity is exhausted, new data shall replace oldest data

Odometer Data

The tachograph shall store in its data memory odometer values at minimum 1 minute interval for at least 365 calendar days.

Speed Data.

The tachograph shall store in its data memory speed values at minimum 1 minute interval for at least 365 calendar days.

The tachograph shall record and store in its data memory the instantaneous speed of the vehicle and the corresponding date and time every second for at least the last 24 hours that the vehicle has been moving.

Event Data

The tachograph shall record and store in its data memory the following data for each event detected to the following storage rules

Event	Storage rules	Data to be recorded per event
Card insertion while driving.	- the last event for each of the 10 last days of occurrence	- date and time of the event, - card number, - number of similar events that day.
Over Speeding	- the most serious for each of the 10 last days of occurrence (i.e. the one with the highest average speed). - The five most serious events over the last 365 days.	- date and time of beginning of event, - date and time of end of event, - maximum speed measured during the event, - arithmetic average speed measured during the event, - card number, - number of similar events that day.
Power Supply interruption	- the longest event for each of the 10 last days of occurrence, - The five most events over the last 365 days.	- date and time of beginning of event, - date and time of end of event, - card number, - number of similar events that day.
Speed Sensor error	- the longest event for each of the 10 last days of occurrence, - The five most events over the last 365 days.	- date and time of beginning of event, - date and time of end of event, - card number, - number of similar events that day.
Security breach attempt	- the most recent events per type of event.	- date and time of beginning of event, - date and time of end of event, - card number, - type of event.

Faults Data

The tachograph shall attempt to record and store in its data memory the data for each fault detected according to the following storage rules

Fault	Storage rules	Data to be recorded per event
Card fault	- the 10 most recent driver card faults	- date and time of beginning of fault, - date and time of end of fault, - card number.
Tachograph faults	- the 10 most recent faults for each type of faults	- date and time of beginning of fault, - date and time of end of fault, - type of fault, - card number.

5.11 Displaying

The Display shall include at least 20 characters.

The display shall be provided with adequate non-dazzling lighting.

The display shall always be ON when the vehicle is moving.

The tachograph may include a manual or automatic feature to turn the display OFF when the vehicle is not moving.

Warning Display

The tachograph shall display warning information using suitable means.

5.12 Warnings

The tachograph shall warn the driver when detecting any event and / or fault.

Warning of a power supply interruption event may be delayed until the power supply is reconnected.

Warning shall be visual. Audible warnings may also be provided in addition to visual warnings.

Visual warnings shall be clearly recognizable by the user, shall be suited in the driver's field of vision and shall be clearly legible both by day and by night.

Visual warnings may be built into the tachograph and / or from the tachograph.

Warnings shall have duration of at least 30 seconds, unless acknowledged by the user by hitting any key of the tachograph. This first acknowledgement shall not erase warning causes display.

5.13 Data Downloading to External Media

The tachograph shall be able to download on request data from its data memory or from a driver card to external storage media via the downloading connector. The tachograph shall update data stored on the relevant card before starting downloading.

Downloading shall not alter or delete any stored data.

5.14 Time Adjustment

The time adjustment function of the tachograph shall allow for adjusting the current time in amounts of one minute maximum at intervals of not less than seven days.

5.15 Performance Characteristics.

The vehicle until shall be fully operational in the temperature range -20°C to 70°C , and the speed sensor in the temperature range -40°C to 135°C . Data memory content shall be preserved at temperature down to -40°C .

The tachograph shall be fully operational in the humidity range of 10% to 90%.

ANNEXURE :III
(See 2.1.5 of Annexure II)

**CONSTRUCTION AND FUNCTIONAL REQUIREMENTS FOR
TACHOGRAPH CARDS**

1.0 Visible Data

The front page of the card shall be printed with the large-type words “Driver Card” or “Company Card”.

The front page of the card shall have provision for printing information specific to the card such as

- i) Driver Card: Name & Address of Driver, Photograph of Driver, Signature of Driver, Driving License No. of Driver, Card No., Card Validity/Expiry Date
- ii) Company Card: Name & Address of Company, Card No., Card Validity/Expiry Date

2.0 Security

The system security aims at protecting integrity and authenticity of data exchanged between the cards and tachograph, protecting the integrity and authenticity of data down-loaded from the cards, allowing certain write operations on to the cards to tachograph only, ruling out any possibility of falsification of data stored in the card, preventing tampering and detecting any attempt of that kind.

The tachograph cards shall broadly achieve the above system security requirements.

3.0 Environmental and Electrical Requirements

The tachograph cards shall be capable of satisfactory operation in all the climatic conditions normally encountered in the temperate range – 25°C to + 70°C.

The tachograph cards shall be capable of satisfactory operation in the humidity range 10% to 90%.

During operation, the tachograph cards shall comply with the requirements of AIS-004/1999 related to electromagnetic compatibility and shall be protected against electrostatic discharge, when tested as per IEC: 61000 – 4 - 2, ± 2 kV (Level 1).

4.0 Data Storage

4.1 For the purpose of this requirement

- a) times are recorded with resolution of one minute
- b) odometer values recorded with resolution of one km
- c) speeds are recorded with resolution of one km/h

4.2 Driver Card

The driver card shall be able to store the following

- a) Card identification
- b) Card holder identification
- c) Driving license information
- d) Vehicle usage data
- e) Driver activity data: The driver card memory shall be able to hold driver activity data for at least 28 days
- f) Events data
- g) Faults data

4.3 Company Card

The company card shall be able to store the following

- a) Card identification
- b) Card holder identification
- c) Company activity data

ANNEXURE IV

(See 3.0)

REQUIREMENTS FOR EXTENSION OF TYPE APPROVAL

1. Any modification in software or hardware of the tachograph or in the nature of materials used for its manufacture shall, before being used, be notified to the test agency which granted type approval for the equipment. The test agency shall confirm to the manufacturer the extension of type approval based on relevant functional checks/tests.
2. Procedure to upgrade the software of the tachograph field units shall be approved by the test agency which granted type approval of the equipment. Software upgrade must not alter nor delete any driver activity data stored in the tachograph. Software may be upgraded only under the responsibility of the equipment manufacturer.

ANNEXURE V
(See Introduction)
COMMITTEE COMPOSITION *
Automotive Industry Standards Committee

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Members	Representing
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Shri Sushil Kumar	Department of Heavy Industry, Ministry of Heavy Industries & Public Enterprises, New Delhi
Shri Chandan Saha	Office of the Development Commissioner, Small Scale Industries, Ministry of Small Scale Industries, New Delhi
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* At the time of approval of this Automotive Industry Standard (AIS)