



SLOVENSKI STANDARD SIST EN 50436-4:2022

01-september-2022

Nadomešča:
SIST EN 50436-4:2019

Alkoholne zapore - Preskusne metode in zahtevane lastnosti - 4. del: Konektor in digitalni vmesnik med alkoholno zaporo in vozilom

Alcohol interlocks - Test methods and performance requirements - Part 4: Connection and digital interface between the alcohol interlock and the vehicle

Alkohol-Interlocks - Prüfverfahren und Anforderungen an das Betriebsverhalten - Teil 4: Verbindung und digitale Schnittstelle zwischen dem Alkohol-Interlock und dem Fahrzeug

Ethylotests antidémarrage - Méthodes d'essais et exigences de performance - Partie 4: Connexion et interface numérique entre l'éthylotest antidémarrage et le véhicule

Ta slovenski standard je istoveten z: EN 50436-4:2022

ICS:

13.200	Preprečevanje nesreč in katastrof	Accident and disaster control
43.040.80	Sistemi za zaščito pri trku in sistemi za zadrževanje potnikov	Crash protection and restraint systems

SIST EN 50436-4:2022 en

EUROPEAN STANDARD

EN 50436-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2022

ICS 71.040.40; 43.040.10

Supersedes EN 50436-4:2019

English Version

Alcohol interlocks - Test methods and performance requirements - Part 4: Connection and digital interface between the alcohol interlock and the vehicle

Ethylotests antidémarrage - Méthodes d'essais et exigences de performance - Partie 4: Connexion et interface numérique entre l'éthylotest antidémarrage et le véhicule

Alkohol-Interlocks - Prüfverfahren und Anforderungen an das Betriebsverhalten - Teil 4: Verbindung und digitale Schnittstelle zwischen dem Alkohol-Interlock und dem Fahrzeug

This European Standard was approved by CENELEC on 2022-06-20. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN 50436-4:2022 (E)

Contents	Page
European foreword	3
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Connection between alcohol interlock and vehicle	8
4.1 Installation documentation	8
4.2 Data bus specification	8
4.3 Properties of a connector	9
4.4 Behaviour of the vehicle.....	10
4.5 Activation of the alcohol interlock.....	10
4.6 Deactivation of the alcohol interlock following a shutdown request.....	10
4.7 Maintaining power to the alcohol interlock	11
5 Basic connection architecture for the data bus	11
6 Communication	12
6.1 General.....	12
6.2 Communication states of the vehicle	12
6.3 Communication states of the alcohol interlock.....	13
6.4 Interaction between vehicle and alcohol interlock.....	18
7 Implementation of the communication states	18
7.1 General.....	18
7.2 Coding of data bus signals.....	18
7.3 Signal Validation and error handling	19
7.4 LIN identifiers and services	20
7.5 CAN-Services.....	24
8 Communication states and corresponding messages	24
8.1 Vehicle communication states and corresponding frames.....	24
8.2 Interlock communication states and corresponding frames.....	26
9 System safety analysis	30
10 Testing	30
Annex A (informative) Examples of vehicle – alcohol interlock interactions	31
Annex B (informative) State transition tables	39
Annex C (informative) Hazard Analysis and Risk Assessment in accordance with the requirements of ISO 26262	43
Annex D (informative) Example of a LIN 2.0 description file	44
Annex E (informative) Example of a LIN 2.2 description file	47
Annex F (informative) Example of a J 1939 DBC file	50
Annex G (informative) Conformance testing	55
G.1 LIN conformance testing	55
G.2 CAN J1939 conformance testing	55
Annex H (informative) Proposed test plan	56
Bibliography	113

European foreword

This document (EN 50436-4:2022) has been prepared by CLC/BTTF 116-2 "Alcohol Interlocks".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-06-20
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2025-06-20

This document will supersede EN 50436-4:2019 and all of its amendments and corrigenda (if any).

EN 50436-4:2022 includes the following significant technical changes with respect to EN 50436-4:2019:

- Clause 3, terms and definitions, definitions were added for CAN and DBC;
- Clause 4.2, the CAN data bus was added as new data bus connection;
- Clause 4.3.3, the option to switch off the power supply to the alcohol interlock was included;
- Clause 4.5, the activation of the alcohol interlock was specified;
- Clause 4.6, the deactivation of the alcohol interlock was specified;
- Clause 5, the clause was simplified and updated;
- Clause 6, the alcohol interlock communication state Service was deleted;
- Clause 7.5, the specification of CAN services was added;
- Clause 8, the clause was updated and some communication state parameters were updated and clarified;
- Clause 9, the clause was updated;
- Clause 10, new clause was added to provide a link to the test plan in Annex H;
- Annex A, figures were updated to meet communication states;
- Annex B, tables were updated to meet new transition requirements;
- Annex C, the annex was reworked completely;
- Annex D, the annex was updated;
- Annex E, the annex was updated;
- Annex F, a sample DBC file was added as Annex;
- Annex G, the annex was updated;
- Annex H, the proposed test plan was added as an informative Annex.

EN 50436-4:2022 (E)

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 50436-4:2022](https://standards.iteh.ai/catalog/standards/sist/9b3e1a59-b88e-4237-a2c0-3c294226613c/sist-en-50436-4-2022)

<https://standards.iteh.ai/catalog/standards/sist/9b3e1a59-b88e-4237-a2c0-3c294226613c/sist-en-50436-4-2022>

Introduction

The purpose of alcohol interlocks is to enhance traffic safety by preventing persons with alcohol concentrations exceeding a set limit value from driving a motor vehicle. The EN 50436 series specifies test methods and essential performance requirements for alcohol interlocks and gives guidance for decision makers, purchasers and users.

There are several areas in which alcohol interlocks may be used:

- installed in a vehicle as a general preventive measure for the promotion of traffic safety, on a voluntary base or required legally in certain vehicles (e.g. vehicles for children transport), or
- in vehicles as ordered by a court or an administrative authority as part of a drink-driving offender programme, or
- for persons subject to a medical or rehabilitation programme.

Alcohol interlocks are often intended for after-market installation. For this purpose they have to be connected to the electrical circuits of the vehicle.

This installation of an alcohol interlock is expected not to interfere with the proper performance of the vehicle, nor to impair the safety and security of the vehicle; and to be as easy and as fast as possible. Additionally, the installation costs should be low in relation to the total cost of the alcohol interlock.

Therefore, it is desirable to have a standardised interface between alcohol interlocks and vehicles.

The alcohol interlock suppliers are expected to detail all the information that they will use/send. All used data/information is expected to respect the cyber security protocol and rules of the vehicle.

NOTE A new standard ISO/SAE 21434 to define requirements for cybersecurity engineering is under preparation.

All data required by the alcohol interlock from the vehicle is expected to be defined clearly and not be transferred outside the vehicle if this digital communication is used.

EN 50436-4:2022 (E)**1 Scope**

This document specifies the interface between an alcohol interlock for production and aftermarket installation and a vehicle. It details the modes of electrical connections, the assignment of electrical connection lines as well as the information to be exchanged between the vehicle and the alcohol interlock.

This document is applicable to alcohol interlocks for drink-driving-offender programmes (as in EN 50436-1) as well as to alcohol interlocks for general preventive use (as in EN 50436-2).

This document is mainly directed at manufacturers of alcohol interlocks and at vehicle manufacturers.

This document is referenced in EN 50436-7 and provides details of the preferred data bus connection suggested therein.

NOTE This document describes the information exchange using a LIN or a CAN (J1939) connection.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50436-1:2014, *Alcohol interlocks — Test methods and performance requirements — Part 1: Instruments for drink-driving-offender programs*

EN 50436-2, *Alcohol interlocks — Test methods and performance requirements — Part 2: Instruments having a mouthpiece and measuring breath alcohol for general preventive use*

EN 50436-7:2016, *Alcohol interlocks — Test methods and performance requirements — Part 7: Installation document*

ISO 17987-1:2016, *Road vehicles — Local Interconnect Network (LIN) — Part 1: General information and use case definition*

ISO 17987-2:2016, *Road vehicles — Local Interconnect Network (LIN) — Part 2: Transport protocol and network layer services*

ISO 17987-3:2016, *Road vehicles — Local Interconnect Network (LIN) — Part 3: Protocol specification*

ISO 17987-4:2016, *Road vehicles — Local Interconnect Network (LIN) — Part 4: Electrical physical layer (EPL) specification 12 V/24 V*

ISO/TR 17987-5:2016, *Road vehicles — Local Interconnect Network (LIN) — Part 5: Application programmers interface (API)*

ISO 17987-6:2016, *Road vehicles — Local Interconnect Network (LIN) — Part 6: Protocol conformance test specification*

ISO 17987-7:2016, *Road vehicles — Local Interconnect Network (LIN) — Part 7: Electrical Physical Layer (EPL) conformance test specification*

ISO 17987-8:2019, *Road vehicles — Local Interconnect Network (LIN) — Part 8: Electrical physical layer (EPL) specification: LIN over DC powerline (DC-LIN)*

SAE J1939 (series), *Serial Control and Communications Heavy Duty Vehicle Network*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50436-1:2014 and EN 50436-7:2016 apply.

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

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

3.1

motor

includes combustion engine, electric motor or hybrid power unit

3.2

odometer

instrument that indicates the distance travelled by the vehicle

3.3

passed breath test

breath test for which the user provided an accepted breath sample having a breath alcohol concentration below the breath alcohol concentration limit

3.4

failed breath test

breath test for which the user did not provide an accepted breath sample or has provided an accepted breath sample with an alcohol concentration equal to or above the breath alcohol concentration limit

3.5

lockout

condition in which the alcohol interlock will not accept a breath test and thereby prevents the user from starting the vehicle motor for a predetermined period of time

Note 1 to entry: Lockout could be required by regulatory requirements.

3.6

Local Interconnect Network

LIN

serial network protocol used for digital communication between components in vehicles

3.7

LIN description file

LDF

file that is created in the LIN cluster design and parsed in the LIN cluster generation or by debugging tools

Note 1 to entry: It contains LIN nodes, signals, frames and schedule table and other parameters relevant for LIN communication in a LIN network.

3.8

Controller Area Network

CAN

vehicle bus standard designed to allow microcontrollers and devices to communicate with each other in applications without a host computer

EN 50436-4:2022 (E)**3.9****Database Container File****DBC**

CAN data description file format

Note 1 to entry: It is a text file that contains information for decoding raw CAN bus data to physical values.

3.10**ADR**

1957 United Nations treaty that governs transnational transport of hazardous materials

Note 1 to entry: The treaty of 30 September 1957 concerns the International Carriage of Dangerous Goods by Road.

4 Connection between alcohol interlock and vehicle**4.1 Installation documentation****4.1.1 Installation document of the vehicle**

The installation of an alcohol interlock shall be described in an installation document according to EN 50436-7.

All extra parts that are required for the installation of an alcohol interlock according to this document shall be specified by at least name and part number in the referring installation document according to EN 50436-7.

4.1.2 Labelling and marking of the alcohol interlock

In addition to the labelling and marking according to EN 50436-1:2014, the alcohol interlock shall be marked legibly with the following minimum requirements:

- used interface or used interfaces and versions,
- used protocol version of EN 50436-4,
- reference to other applied technical standards (if applicable).

4.2 Data bus specification**4.2.1 General**

The information exchange between the alcohol interlock and the vehicle shall be performed via a LIN data bus or a CAN Data bus.

NOTE For the information exchange between the alcohol interlock and the vehicle, a gateway can be used to adapt to the requested communication standards (LIN or CAN). Both the alcohol interlock and gateway are handled in the following standard as single units.

4.2.2 LIN Data Bus

The LIN master is on the vehicle side.

The alcohol interlock system shall act as a LIN slave.

The LIN Master and the interlock as a LIN slave shall conform to at least one of the following specifications: LIN Revision 2.0, LIN revision 2.1, LIN revision 2.2, LIN revision 2.2A, LIN according to ISO 17987-1:2016, ISO 17987-2:2016, ISO 17987-3:2016, ISO 17987-4:2016, ISO/TR 17987-5:2016, ISO 17987-6:2016, ISO 17987-7:2016, ISO 17987-8:2019 or later.

4.2.3 CAN Data Bus

The CAN data bus shall conform with the SAE J1939 series network protocol with a data rate of at least 250 kBit/s.

4.3 Properties of a connector

4.3.1 Systems using a LIN data bus

If the vehicle provides a connector at the end of cable harnesses or another specific location for the connection to the alcohol interlock, the connector shall have at least 3 connections with the assignments given in Table 1.

The exact type of the connector and pinout shall be specified in the installation document according to EN 50436-7.

It is recommended to propose 6-pin connectors.

NOTE The ground pin can be separated into two independent pins within a 4 pin connector.

4.3.2 Systems using a CAN data bus

If the vehicle provides a connector at the end of cable harnesses or another specific location for the connection to the alcohol interlock, the connector shall have at least 4 connections with the assignments given in Table 1.

The exact type of the connector and pinout shall be specified in the installation document according to EN 50436-7.

It is recommended to propose 6-pin connectors.

4.3.3 Minimum pin assignments

Table 1 gives the minimum pin assignments of a connector for LIN and CAN SAE J1939 series. It is to the discretion of the manufacturer to provide one or both data bus options on the connector.

Table 1 — Minimum pin assignments of a connector for LIN and CAN SAE J1939 series

<i>Purpose</i>	<i>Details</i>
Battery feed of the alcohol interlock	+9 V to + 36 V battery feed (terminal +30) as specified in EN 50436-7:2016, Annex C, with the exception that in the low power consumption mode of the alcohol interlock, the vehicle may switch off the power supply to the alcohol interlock.
Ground for the voltage supply of the alcohol interlock and data bus ground	0 V ground (terminal -30)
Data bus high	LIN High (ISO 17987 series)
CAN_H	CAN High (SAE J1939 series)
CAN_L	CAN Low (SAE J1939 series)

NOTE 1 The sequence of pin listing is arbitrary, e.g. lines are not necessarily in adjacent cavities. The exact pin numbering is specified in the installation document according to EN 50436-7:2016, Annex C, 3c.

NOTE 2 The ground pin can be separated into two independent pins within a 4 pin connector.

EN 50436-4:2022 (E)

4.4 Behaviour of the vehicle

4.4.1 General

The vehicle that is equipped with an alcohol interlock which is installed according to this document shall not enable the start of the motor or vehicle movement if it receives the information that the interlock is in the blocking state or communication to the interlock is not possible or not plausible/unexpected.

The vehicle shall not cause a running vehicle motor to stop, even in the case of receiving a blocking information from the interlock after a missed or a failed retest.

NOTE National regulation or special requirements can modify this requirement.

4.4.2 Installation

The vehicle shall conform to the behaviour of 4.4.1 after the first successful communication with the alcohol interlock with a confirmed protocol validation.

The installation could require specified sequence of actions in order to install the alcohol interlock, that shall be documented according to 4.1.

The installation procedure shall include a test that provides evidence for the successful installation of the alcohol interlock.

4.4.3 Removal

The removal of the alcohol interlock could require a specified sequence of actions in order to remove the alcohol interlock, that shall be documented in the installation document according to EN 50436-7.

4.5 Activation of the alcohol interlock

The alcohol interlock shall be activated when the vehicle is activated.

Vehicles that communicate with the alcohol interlock via LIN Bus shall make use of the LIN WAKE UP procedure. <https://standards.iteh.ai/catalog/standards/sist/9b3e1a59-b88e-4237-a2c0->

The LIN WAKE UP procedure shall not be performed by the alcohol interlock.

NOTE 1 This is not a requirement for a breath test with each activation of the vehicle.

NOTE 2 LIN WAKE UP is a procedure described in reference [1] of the bibliography.

NOTE 3 The wake up procedure for CAN systems as is required by the vehicle manufacturer is described in the installation documentation according to EN 50436-7.

4.6 Deactivation of the alcohol interlock following a shutdown request

The alcohol interlock shall go into its low power consumption mode where it can be switched off by the vehicle without error no longer than 10 s after the vehicle goes into its shutdown state and the alcohol interlock has acknowledged this.

NOTE National regulations could require different timings, examples could be vehicles that comply with ADR.

Vehicles that communicate with the alcohol interlock via LIN Bus shall transmit the go to sleep command after receiving the shutdown acknowledgement of the alcohol interlock.

The maximum time period between a not acknowledged shutdown and an acknowledged shutdown shall be 5 min.

4.7 Maintaining power to the alcohol interlock

The vehicle shall maintain uninterrupted power for the alcohol interlock if this is requested by the alcohol interlock.

The alcohol interlock shall only request power maintenance if the vehicle is stationary and in a service environment.

The minimum time period during which power supply to the alcohol interlock shall be maintained after it has entered into a communication state that requests this shall be 5 min.

After the alcohol interlock has communicated that it is in a state where power maintenance is required, the digital connection to the vehicle could be lost e.g. due to a restart of the alcohol interlock. In such cases the alcohol interlock shall restart by entering its initial communication state as described in 6.3.2.

NOTE Power maintenance is designed e.g. software maintenance and update, where complete resets under power could be needed. Complete resets can cause breaks in the communication, which will not lead to a disconnection of power if the alcohol interlock has requested power maintenance. Updates will always be type tested and preferably be performed in a workshop environment.

5 Basic connection architecture for the data bus

There are two basic options for the connection architecture between the vehicle and the alcohol interlock:

- Direct connection to a LIN bus or a CAN bus of the vehicle or
- Indirect connection to a digital bus of the vehicle via a LIN or CAN gateway.

The specifications of 4.2 apply.

The principle of the connection is shown in Figure 1.

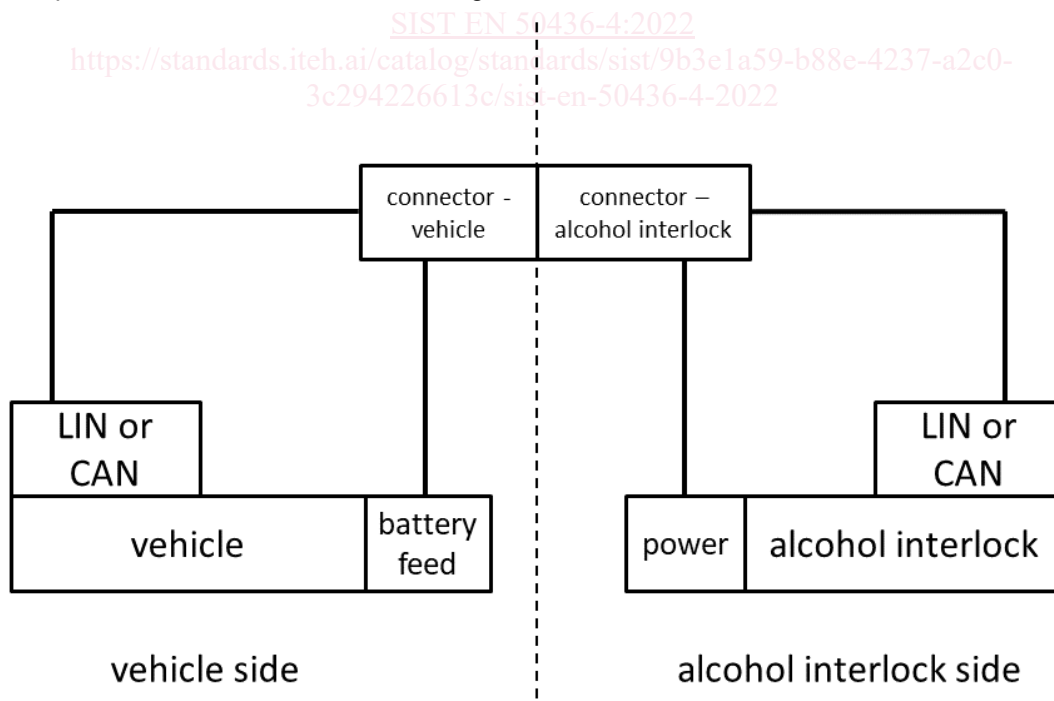


Figure 1 — Direct connection of alcohol interlock and vehicle bus

EN 50436-4:2022 (E)**6 Communication****6.1 General**

The communication between the vehicle and the alcohol interlock shall use communication states. Respective state transition tables are provided in Annex B.

6.2 Communication states of the vehicle**6.2.1 General**

The vehicle shall have the following communication states:

- a) Protocol Validation;
- b) Set Mode;
- c) Unset Mode;
- d) Shutdown.

6.2.2 Vehicle communication state Protocol Validation

The vehicle shall be in the communication state <PROTOCOL_VALIDATION> if it requests the protocol validation from the alcohol interlock. The communication state <PROTOCOL_VALIDATION> shall be the initial communication state of the vehicle.

The additional entry action is:

- a) the vehicle requests a protocol validation from the alcohol interlock.

The exit actions are:

- b) the alcohol interlock has successfully validated the protocol;
- c) the vehicle shuts down.

The vehicle shall not allow the driver to start the motor or enable the motion of the vehicle if the vehicle is in the communication state <PROTOCOL_VALIDATION>.

6.2.3 Vehicle communication state Set Mode

The vehicle shall be in the communication state <SET_MODE> when the vehicle is in a state in which it cannot be driven normally under its own power. This state shall last until the start of the motor or the motion of the vehicle.

The entry actions are:

- a) the interlock has authenticated itself and the vehicle cannot be driven normally under its own power;
- b) transitions in accordance to 6.2.6.

The exit actions are:

- c) the vehicle shuts down;
- d) the vehicle goes into the state in which it can be driven normally under its own power;
- e) the vehicle goes into bypass mode.

NOTE The most usual way that the vehicle goes into the state in which it can be driven normally under its own power is that the motor is started.

6.2.4 Vehicle communication state Unset Mode

The vehicle shall be in the communication state <UNSET_MODE> when the vehicle is in the state in which it can be driven normally under its own power.

The entry action is:

- a) the vehicle goes into the state in which it can be driven normally under its own power;

The exit actions are:

- b) the vehicle shuts down;
- c) transitions in accordance to 6.2.6.

6.2.5 Vehicle communication state Shutdown

The vehicle shall feature the communication state <SHUTDOWN>.

The entry action is:

- a) the vehicle shuts down.

The exit action is:

- b) the vehicle ends its shut down procedure.

6.2.6 Transitions from Unset Mode to Set Mode

The vehicle shall enter in the communication state <SET_MODE> without supplementary action from the driver by at least one of the following means:

- a) at rotation of the ignition key into the "0" position in the ignition lock or equivalent and activation of a door; in addition, vehicles that enter the communication state <UNSET_MODE> immediately before or during the normal starting procedure of the vehicle are permitted to enter the <SET_MODE> on turning the ignition off;
- b) at a maximum of 1 min after the motor has turned off and is not in stop while the vehicle is stationary.

If there is no ignition key the equivalent to the rotation of the ignition key into the "0" position shall be described in the installation document according to EN 50436-7.

Within the transition period from UNSET to SET, changing ignition states without starting the motor shall not affect the timers or conditions.

6.3 Communication states of the alcohol interlock

6.3.1 General

The alcohol interlock shall have the following communication states:

- a) Activated;
- b) Protocol Validation;
- c) Service Information;
- d) Warm Up;
- e) Test Request;
- f) Analysing;