SLOVENSKI STANDARD
SIST EN 50436-4:2019

01-april-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

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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

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

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European foreword

This document (EN 50436-4:2019) 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)	2019-12-10
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2021-12-10

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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 European Standard series EN 50436 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 shall not interfere with the proper performance of the vehicle, shall not impair the safety and security of the vehicle, and shall 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 shall detail all the information that they will use/send. All used data/information shall 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 shall be defined clearly and not be transferred outside the vehicle if this digital communication is used.

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 standard describes the information exchange using a LIN 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 50436-2:2014, *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 17987:2016 (series), *Road vehicles – Local Interconnect Network (LIN)*

ISO 26262 (series), *Road vehicles – Functional safety*

3 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 http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
motor
motor includes combustion engine, electric motor or hybrid power unit

3.2
odometer
instrument that indicates 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 may 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.

4 Connection between alcohol interlock and vehicle

4.1 Installation document

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

4.2 Data bus specification

The information exchange between the alcohol interlock and the vehicle shall be performed via a 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 17987:2016 or later.

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

4.3 Behaviour of the vehicle

The vehicle shall not enable the start of the motor 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.

4.4 Properties of a connector

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.

Table 1 — Minimum pin assignment of a connector

Pin	*Purpose*	*Details*
1	Battery feed of the alcohol interlock	+9 V to + 36 V battery feed (terminal +30) as specified in Annex C of EN 50436-7:2016 with the exception that the alcohol in low power consumption mode shall not require a current of more than 1 mA.
2	Ground for the voltage supply of the alcohol interlock and data bus ground	0 V ground (terminal −30)
3	Data bus high	LIN High (ISO 17987 (series))

NOTE 1 The sequence of pin numbering is arbitrary and for counting reasons only, 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 Pin 2 can be separated into two independent pins within a 4 pin connector.

5 Basic connection architecture for the data bus

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

a) Direct connection to the LIN bus of the vehicle or

b) Indirect connection to a gateway to the LIN bus of the vehicle or a LIN gateway to any bus used in the vehicle (e.g. CAN).

The specifications of 4.2 apply.

A direct connection is shown in Figure 1.

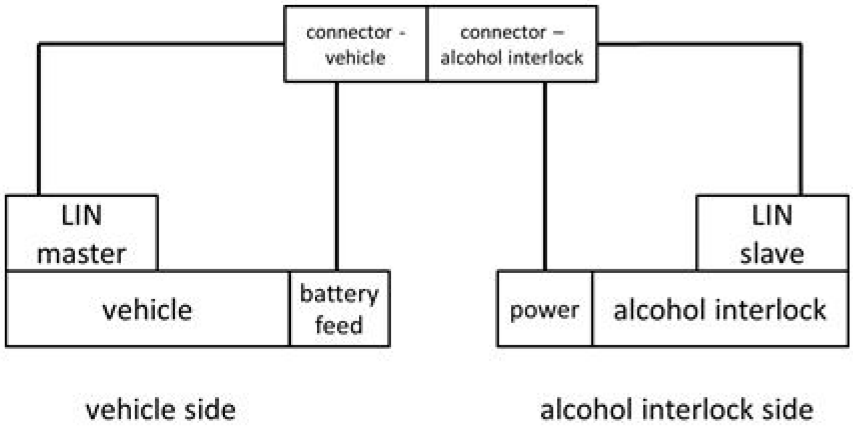

Figure 1 — Direct connection

An indirect connection with a LIN interface is shown in Figure 2. The LIN interface is proprietary to the vehicle manufacturer. In this kind of connection, the alcohol interlock is a LIN-slave connected to a LIN gateway.

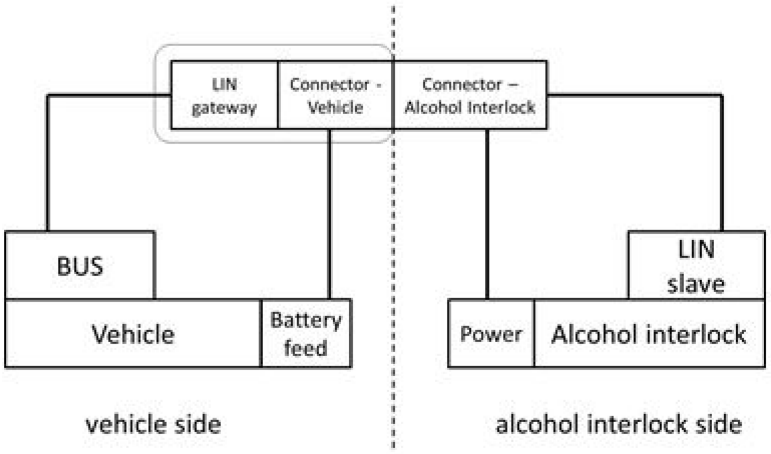

Figure 2 — Indirect connection with a LIN interface

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 The 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 The 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 that the vehicle requests a protocol validation from the alcohol interlock.

The exit actions are:

a) the alcohol interlock has successfully validated the protocol;

b) the vehicle shuts down.

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

6.2.3 The 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 a passed initial breath test has been provided.

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 motor was started.

6.2.4 The 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 that the motor has started.

The exit actions are:

a) the vehicle shuts down;

b) transitions in accordance to 6.2.6.

6.2.5 The vehicle communication state Shutdown

The vehicle shall feature the communication state <SHUTDOWN>. The entry action is that the vehicle is requesting the alcohol interlock to shut down. The exit action is that 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 The 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;

g) Result;

h) Wait Ignition;

i) Idle;

j) Lockout;

k) Service;

l) Error.

6.3.2 The alcohol interlock communication state Activated

The alcohol interlock shall feature the communication state <ACTIVATED>.

The entry action is that the alcohol interlock is activated.

The exit action is that the alcohol interlock receives the vehicle message request <PROTOCOL_VALIDATION>.

The communication state <ACTIVATED> shall be the initial communication state of the alcohol interlock.

6.3.3 The alcohol interlock communication state Protocol Validation

The alcohol interlock shall feature the communication state <PROTOCOL_VALIDATION>.

In the communication state <PROTOCOL_VALIDATION> the alcohol interlock shall transmit protocol related information.

The entry action is the reception of the vehicle message request <PROTOCOL_VALIDATION>.

The exit action is the vehicle message request <SET_MODE> under the condition that the protocol version is supported.

If the protocol is not supported, the alcohol interlock shall stay in its communication state <PROTOCOL_VALIDATION>.

NOTE According to 6.3.10 the alcohol interlock always transits into the communication state <IDLE> after leaving the communication state <PROTOCOL_VALIDATION>.

6.3.4 The alcohol interlock communication state Service Information

The alcohol interlock shall feature the communication state <SERVICE_INFORMATION>.

In the communication state <SERVICE_INFORMATION> the alcohol interlock transmits service related information.

The entry action is that the alcohol interlock needs to send service information.

The exit actions are:

a) the alcohol interlock has sent the service information;

b) the alcohol interlock receives the <SHUTDOWN> request.

NOTE According to 6.3.10 the alcohol interlock always transits into the communication state <IDLE> after leaving the communication state <SERVICE_INFORMATION>.

6.3.5 The alcohol interlock communication state Warm Up

The alcohol interlock shall feature the communication state <WARM_UP>.

In the communication state <WARM_UP> the alcohol interlock transmits that it is preparing for a breath test.

The entry action is that the interlock communicates that it is preparing for a breath test.

The exit actions are:

a) that the alcohol interlock is prepared for a breath test;

b) an error not related to a breath sample occurs;

c) the alcohol interlock receives the <SHUTDOWN> request.

NOTE Alcohol interlocks that do not need a preparation period cannot enter the communication state <WARM_UP>.

6.3.6 The alcohol interlock communication state Test Request

The alcohol interlock shall feature the communication state <TEST_REQUEST>.

In the communication state <TEST_REQUEST> the alcohol interlock requests a breath test.

The entry actions are:

a) the request of an initial test;

b) the request of a retest.

The exit actions are:

c) a breath sample was provided;

d) the expiration of the test request period;

e) an error related to a breath sample occurs;

f) an error not related to a breath sample occurs;

g) the alcohol interlock receives the <SHUTDOWN> request.

6.3.7 The alcohol interlock communication state Analysing

The alcohol interlock shall feature the communication state <ANALYSING>.

In the communication state <ANALYSING> the alcohol interlock analyses a breath sample.

The entry actions are:

a) an accepted breath sample was provided;

b) a non-accepted breath sample was provided;

c) the expiration of the test request period.

The exit actions are:

d) the result of an accepted breath sample analysis is available;

e) an error related to a breath sample is recognized;

f) an error not related to a breath sample occurred;

g) the alcohol interlock receives the <SHUTDOWN> request.

NOTE The condition that no breath sample was provided is considered an error related to a breath sample in the context of this clause.

6.3.8 The alcohol interlock communication state Result

The alcohol interlock shall feature the communication state <RESULT>.

In the communication state <RESULT> the alcohol interlock communicates the results of the analysis.

The entry actions are:

a) the interlock has analysed an accepted breath sample;

b) the interlock has recognized the reason for an error related to a breath sample.

The exit actions are:

c) alcohol interlock has transmitted the result information;

d) an error not related to a breath sample occurred;

e) the alcohol interlock receives the <SHUTDOWN> request.

NOTE The condition that no breath sample was provided is considered an error related to a breath sample in the context of this clause, i.e. the expiration of the test request period.

6.3.9 The alcohol interlock communication state Wait Ignition

The alcohol interlock shall feature the communication state <WAIT_IGNITION>.

In the communication state <WAIT_IGNITION> the alcohol interlock communicates that it waits for the driver to start, or equivalent, the motor of the vehicle.

The entry action is the beginning of a start or restart period.

The exit actions are:

a) the start, or equivalent, of the motor;

b) the end of the start or restart period;