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Road vehicles — Ergonomics aspects of transport information and control systems — Human machine interface specifications for keyless ignition systems

Véhicules routiers — Aspects ergonomiques des systèmes de commande et d'information du transport — Spécifications d'interface homme-machine pour des systèmes de démarrage sans clé

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Foreword

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles,* Subcommittee SC 39, *Ergonomics*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The conventional method of operating motor ignition systems requires use of a mechanical key. Keyless ignition systems, that do not require the mechanical interface with the vehicle, improve driver's convenience and are becoming more widespread. This has created a need for immediate standardization of the Human Machine Interface (HMI), since some drivers may have difficulty understanding how to use these systems. This document complements SAE J2948, which covers the operation of keyless ignition systems with the goal of helping to minimize user-initiated errors. That includes:

— the inability to start and stop the vehicle propulsion system,

— exiting the vehicle with the automatic transmission in a non-parking gear,

— exiting the vehicle while the vehicle propulsion system is enabled, and

— exiting the vehicle while the vehicle propulsion system is disabled, but the accessory or electrical systems are active.

This document's scope differs from SAE J2948 as follows:

— actuation of keyless ignition control that is equipped with automatic start/stop systems,

— actuation to start or stop the vehicle propulsion system under emergency situations,

— actuation to start the propulsion system with low battery in the key,

— actuation of keyless ignition control without key code carrying device, and

— recommendations for detailed alerts and status indications identified with specific use-case examples.

Many of these HMI issues vary among manufacturers and even among models from the same manufacturer. To help clarify the use of keyless ignition systems, this document sets guidelines for these new HMI solutions.

As additional explanation and support for developing specific requirements, keyless ignition control use cases are provided as an Annex A.

Road vehicles — Ergonomics aspects of transport information and control systems — Human machine interface specifications for keyless ignition systems

1 Scope

This document provides human machine interface (HMI) design specifications for keyless ignition systems that use key code carrying device for passenger cars (including sport utility vehicles and light trucks) and commercial vehicles (including heavy trucks and buses), independent of vehicle propulsion system. HMI specifications for the electrical key functions include actuation in normal conditions, emergencies, low battery, and avoidance of inadvertent actuations, alerts and specific non-standard situations.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
key code
electronic code, which when transmitted to and stored in the *starting system* (3.4) software, allows the driver to select a vehicle ignition mode using a *keyless ignition control* (3.3)

3.2
key code carrying device
physical device capable of transmitting an electronic *key code* (3.1) to the vehicle *starting system* (3.4)

3.3
keyless ignition control
permanently mounted physical device such as a pushbutton, rocker switch, multi-position control, or rotary control used to perform ignition control such as start or stop a *vehicle propulsion system* (3.6) without need for insertion or removal of a conventional key into/from an ignition slot

3.4
starting system
electronic system that controls the transition between *ignition modes* (3.5) related to the starting or stopping of a vehicle based on driver's request and vehicle conditions

3.5
ignition mode
propulsion and/or vehicle electrical states as determined by vehicle operating conditions and driver actuation of the *keyless ignition control* (3.3)

3.5.1
start mode
transient mode where the *vehicle propulsion system* (3.6) is initiated (e.g. engine cranking), leading to *run mode* (3.5.2), while an electronic key code is present in the *starting system* (3.4)

3.5.2
run mode
mode in which the *vehicle propulsion system* (3.6) is enabled, and an electronic key code is present in the *starting system* (3.4)

Note 1 to entry: Automatic start/stop-equipped vehicles remain in run mode when automatic stop is engaged.

3.5.3
stop mode
mode in which the vehicle propulsion and vehicle electrical systems are disabled, and an electronic key code is not present in the *starting system* (3.4)

Note 1 to entry: Vehicle manufacturers may choose to temporarily keep vehicle electrical systems active, and the key code in the starting system in this mode until a trigger event occurs (such as a driver-door open event or timer event). This vehicle state is sometimes provided to allow use of in-vehicle displays and entertainment systems after the propulsion system is disabled.

3.5.4
electrical mode
accessory mode
mode in which the *vehicle propulsion system* (3.6) is disabled, the vehicle electrical system elements are active as determined by the vehicle manufacturer, and an electronic key code is present in the *starting system* (3.4)

3.5.5
lower ignition mode
modes, which are lower than the *electrical mode* (3.5.4)

Note 1 to entry: This applies to commercial vehicles only.

Note 2 to entry: These become important for commercial vehicles where the drivers must comply with valid driving time regulations that separate between driving, resting and other work. The lower modes help to record time periods spent on alternative activities. Examples of lower ignition modes can be living, parked or hibernate modes.

3.5.5.1
living mode
leisure mode
mode when driver is in the vehicle and can sleep or use some functions to support living in the vehicle

Note 1 to entry: It is necessary to ensure that some safety critical functions are available, e.g. burglar alarm.

3.5.5.2
parked mode
mode when vehicle is parked and not in use and no one is in the cab using the functions

Note 1 to entry: The time is counted to be compared with regulated driving and resting times.

3.5.5.3
hibernate mode
logistics mode
transition time from production to delivery to end customer delivery

Note 1 to entry: This secures very limited functionality like facilitating inserting the key and applying or releasing the parking brake.

3.6
vehicle propulsion system
system that provides forward or rearward movement proportional to driver control inputs

3.7
electronic steering lock
steering lock that enables the steering to lock or unlock electronically

4 Design guidelines

4.1 Actuation of keyless ignition control

4.1.1 Actuation for emergency starting – Restarting the propulsion system after unintended engine stall

After an unintended engine stall, a method of restarting the propulsion system without key code carrying device verification shall be provided at minimum, in the owner's manual. The driver can restart the propulsion system by operating the keyless ignition control or other alternative methods such as pressing the clutch (and brake) pedal for manual transmission vehicles or pressing the brake pedal for automatic transmission vehicles.

For detailed use cases related to each design, see Annex A.

4.1.2 Actuation for starting – Design to avoid accidental starting – Stationary vehicle

The keyless ignition systems shall be designed to prevent accidental activation of putting the vehicle in run mode by requiring a combination of two separate actions. The separate actions can be pressing the brake pedal or other means while operating the keyless ignition control.

For vehicles with integrated power take-offs (e.g. for power take-offs supporting loading or unloading goods), the keyless ignition control shall require a specific operation (e.g. multiple control actuation or long push) and the system shall include precautions so that the vehicle cannot start to move unintentionally (e.g. inactivated transmission and engaged parking brake).

4.1.3 Actuation for stopping while a vehicle with automatic start/stop is in run mode

When the propulsion system (engine) is deactivated (turned off) during idle mode with enabled automatic start/stop, the following applies as the driver operates the keyless ignition control: the propulsion system should exit from run mode and change into the same mode as when operating the keyless ignition control with the propulsion system in ordinary drive mode.

4.1.4 Actuation for stopping (commercial vehicles only) – Design to avoid accidental stopping - Stationary vehicle

The keyless ignition control may have a design to prevent accidental deactivation into stop mode while the propulsion system is needed for a stationary vehicle to secure system durability or safe use of external motorized equipment (e.g. power take-offs for cranes).

4.1.5 Actuation for emergency stopping – Interruption of starting

While the vehicle is in start mode, this process should be stopped when the driver operates the keyless ignition control again before the propulsion system (engine) completes its starting action.

4.2 Starting a propulsion system in case key code carrying device battery runs out

If the battery fails in the key code carrying device, the manufacturer shall provide instructions for how to start the propulsion system.