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Vägtrafikinformatik – System för hela hastighetsområdet för adaptiva farthållare (FSRA) – Prestandakrav och provningsmetoder (ISO 22179:2009, IDT)

Intelligent transport systems – Full speed range adaptive cruise control (FSRA) systems – Performance requirements and test procedures (ISO 22179:2009, IDT)

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Den internationella standarden ISO 22179:2009 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 22179:2009.

The International Standard ISO 22179:2009 has the status of a Swedish Standard. This document contains the official English version of ISO 22179:2009.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00.
Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 22179 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

Introduction

The main system function of full speed range adaptive cruise control (FSRA) is to control vehicle speed adaptively to a forward vehicle by using information about:

a) distance to forward vehicles,

b) the motion of the subject (FSRA equipped) vehicle, and

c) driver commands (see Figure 1).

Based upon the information acquired, the controller (identified as “FSRA control strategy” in Figure 1) sends commands to actuators that carry out its longitudinal control strategy, and sends status information to the driver.

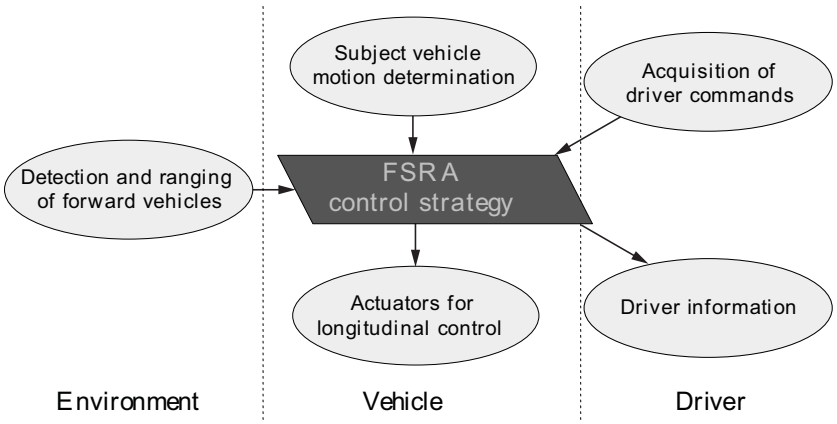


Figure 1 — Functional FSRA elements

The goal of FSRA is partial automation of longitudinal vehicle control to reduce drivers’ workload.

This International Standard may be used as a system level standard by other standards, which extend FSRA to a more detailed standard, e.g. for specific detection and ranging-sensor concepts or higher levels of functionality. Issues such as specific requirements for the detection and ranging sensor function and performance or communication links for co-operative solutions are not considered in this International Standard.

Intelligent transport systems — Full speed range adaptive cruise control (FSRA) systems — Performance requirements and test procedures

1 Scope

This International Standard contains the basic control strategy, minimum functionality requirements, basic driver interface elements, minimum requirements for diagnostics and reaction to failure, and performance test procedures for full speed range adaptive cruise control (FSRA) systems. FSRA is fundamentally intended to provide longitudinal control of equipped vehicles while travelling on highways (roads where non-motorized vehicles and pedestrians are prohibited) under free-flowing and congested traffic conditions. FSRA provides support within the speed domain of standstill up to the designed maximum speed of the system. The system will attempt to stop behind an already tracked vehicle within its limited deceleration capabilities and will be able to start again after the driver has input a request to the system to resume the journey from standstill. The system is not required to react to stationary or slow moving objects {in accordance with ISO 15622 [adaptive cruise control (ACC)]}.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 2575, *Road vehicles — Symbols for controls, indicators and tell-tales*

3 Terms and definitions[1)]

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

3.1
active brake control
function that causes application of the brake(s), not applied by the driver, in this case controlled by the FSRA system

3.2
adaptive cruise control
ACC
enhancement to conventional cruise control systems (see 3.5) which allows the subject vehicle to follow a forward vehicle at an appropriate distance by controlling the engine and/or power train and potentially the brake

3.3
brake
part in which the forces opposing the movement of the vehicle develop

1) Definitions are in accordance with the glossary of ISO/TC 204/WG 14.

EXAMPLE Brakes can be of the following types: a friction brake (where forces are generated by friction between two parts of the vehicle moving relatively to one another); an electrical brake (where forces are generated by electromagnetic action between two parts of the vehicle moving relatively but not in contact with one another); a fluid brake (where forces are generated by the action of a fluid situated between two parts of the vehicle moving relatively to one another); or an engine brake (where forces are derived from an artificial increase in the braking action of the engine, transmitted to the wheels).

NOTE Definition adapted from ECE-R 13-H, except that for the purposes of this International Standard, transmission control devices are not considered as brakes.

3.4
clearance
distance from the forward vehicle's trailing surface to the subject vehicle's leading surface

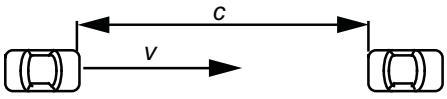
3.5
conventional cruise control
system capable of controlling the speed of a vehicle as set by the driver

3.6
forward vehicle
vehicle in front of, and moving in the same direction and travelling on the same roadway as, the subject vehicle

3.7
free-flowing traffic
smooth flowing and heavy traffic excluding stop-and-go and emergency braking situations

3.8
time gap, τ
time gap calculated as clearance, c, divided by vehicle speed, v

NOTE See Figure 2.



Key

c clearance

v vehicle speed

NOTE $\tau = c/v$

Figure 2 — Time gap

3.9
set speed
desired travel speed, set by either the driver or by some control system that is external to the FSRA system

NOTE The set speed is the maximum desired speed of the vehicle while under FSRA control.

3.10
steady state
condition whereby the value of the described parameter does not change with respect to time, distance, etc.

3.11
subject vehicle
vehicle equipped with the FSRA system in question and related to the topic of discussion

3.12
system state
one of several stages or phases of system operation

NOTE See Figure 3.

3.12.1
FSRA off state
direct access for activation of FSRA active state (3.12.3) is disabled

3.12.2
FSRA stand-by state
state in which there is no longitudinal control by FSRA system and the system is ready for activation by the driver

3.12.3
FSRA active state
state in which the system controls speed and/or clearance

3.12.4
FSRA hold state
state in which the system is active during subject vehicle standstill

3.12.5
FSRA speed control state
state in which the system controls the speed according to the set speed

3.12.6
FSRA following control state
state in which the system controls the clearance to the target vehicle according to the selected time gap

3.13
stationary object
stationary object in front of the subject vehicle

3.14
slow moving object
object in front of the subject vehicle that is moving with less than MAX [1 m/s, 10 % of subject vehicle speed] in the direction of the centreline of the subject vehicle

3.15
target vehicle
vehicle that the subject vehicle follows

3.16
full speed range adaptive cruise control
enhancement to adaptive cruise control systems (3.2), which allows the subject vehicle to follow a forward vehicle at an appropriate distance by controlling the engine and/or power train and the brake down to standstill

4 Symbols and abbreviated terms

$a_{lateral\_max}$	Maximum allowed lateral acceleration in curves
$a_{stopping}$	longitudinal acceleration of the target vehicle at the automatic “stop” capability test
CTT	coefficient for test target, for infrared reflectors
c	clearance, inter-vehicle distance
c_{min}	minimum clearance under steady state conditions for all speeds (including hold state)