

Intelligent transport systems — Adaptive Cruise Control systems — Performance requirements and test procedures

ICS 03.220.20; 35.240.60

National foreword

This British Standard is the UK implementation of ISO 15622:2010.

The UK participation in its preparation was entrusted to Technical Committee EPL/278, Road transport informatics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2010
© BSI 2010

ISBN 978 0 580 63743 8

Amendments/corrigenda issued since publication

Date	Comments

INTERNATIONAL STANDARD

BS ISO 15622:2010

ISO
15622

Second edition
2010-04-15

Intelligent transport systems — Adaptive Cruise Control systems — Performance requirements and test procedures

*Systèmes intelligents de transports — Systèmes stabilisateurs de
vitesse adaptés — Exigences de performance et modes opératoires*



Reference number
ISO 15622:2010(E)
Documents
Document Sharing Hub
© ISO 2010

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2010

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	3
4.1 Symbols.....	3
4.2 Abbreviated terms	4
5 Classification	5
5.1 Type of ACC systems.....	5
5.2 Classification of curve capabilities	5
6 Requirements.....	5
6.1 Basic control strategy.....	5
6.2 Functionality	6
6.3 Basic driver interface and intervention capabilities	9
6.4 Operational limits	10
6.5 Activation of brake lights (ACC type 2 only)	11
6.6 Failure reactions.....	11
7 Performance evaluation test methods	12
7.1 Environmental conditions	12
7.2 Test target specification	12
7.3 Target acquisition range test (see 6.2.4.2)	13
7.4 Target discrimination test (see 6.2.4.3)	14
7.5 Curve capability test (see 6.2.4.4)	16
Annex A (normative) Technical information	19
Bibliography.....	25

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 15622 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This second edition cancels and replaces the first edition (ISO 15622:2002) which has been technically revised.

Introduction

The main system function of Adaptive Cruise Control is to control vehicle speed adaptively to a forward vehicle by using information about: (1) ranging to forward vehicles, (2) the motion of the subject (ACC equipped) vehicle and (3) driver commands (see Figure 1). Based upon the information acquired, the controller (identified as “ACC control strategy” in Figure 1) sends commands to actuators for carrying out its longitudinal control strategy and it also sends status information to the driver.

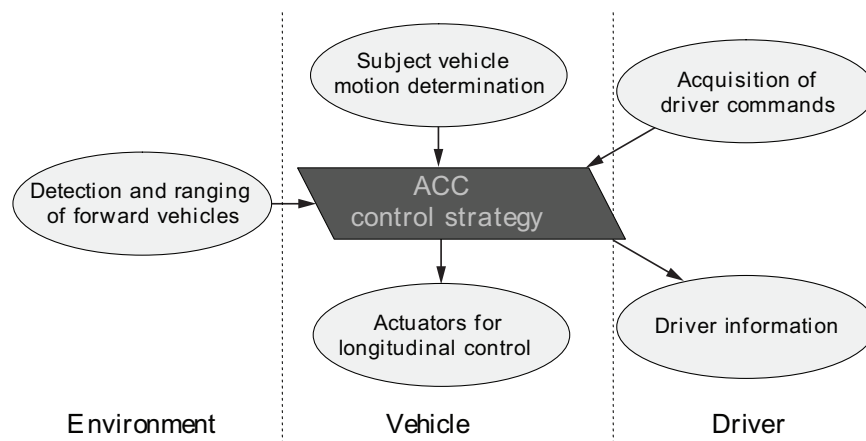


Figure 1 — Functional ACC elements

The goal of ACC is a partial automation of the longitudinal vehicle control and the reduction of the workload of the driver with the aim of supporting and relieving the driver in a convenient manner.

This International Standard can be used as a system level standard by other standards, which extend the ACC to a more detailed standard, e.g. for specific detection and ranging sensor concepts or higher level of functionality. Therefore, issues like specific requirements for the detection and ranging sensor function and performance or communication links for co-operative solutions will not be considered here.

Intelligent transport systems — Adaptive Cruise Control 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 Adaptive Cruise Control (ACC) systems. Adaptive cruise control 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 traffic conditions. ACC can be augmented with other capabilities, such as forward obstacle warning.

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*

UNECE Regulation No. 13-H, *Uniform provisions concerning the approval of passenger cars with regard to braking*

3 Terms and definitions

For the purpose 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 ACC system

3.2

Adaptive Cruise Control

enhancement to conventional cruise control systems [see Conventional Cruise Control (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

NOTE 1 It can be a friction brake (when the forces are generated by friction between two parts of the vehicle moving relatively to one another); an electrical brake (when the forces are generated by electro-magnetic action between two parts of the vehicle moving relatively but not in contact with one another); a fluid brake (when the forces are generated by the action of a fluid situated between two parts of the vehicle moving relatively to one another); an engine brake (when the forces are derived from an artificial increase in the braking action, transmitted to the wheels, of the engine).

NOTE 2 Adapted from UN ECE Regulation No. 13-H:1998, definition 2.6.

NOTE 3 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 (3.11)

3.7

free-flowing traffic

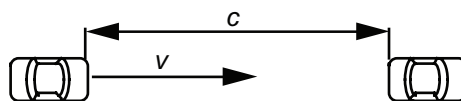
smooth-flowing and heavy traffic excluding stop and go and emergency braking situations

3.8

time gap

τ

value calculated from vehicle speed v and clearance c by: $\tau = c/v$



3.9

set speed

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

NOTE The set speed is the maximum desired speed of the vehicle while under ACC 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 system in question and related to the topic of discussion

3.12

ACC system states

For the purposes of this International Standard, three system states are distinguished (see Figure 2)

3.12.1

ACC off state

state in which direct access for activation of "ACC active state" is disabled

3.12.2

ACC stand-by state

state in which there is no longitudinal control by ACC system and the system is ready for activation by the driver

3.12.3

ACC active state

state in which the system controls speed and/or clearance

3.12.3.1

ACC speed control sub-state

state in which the system controls the speed according to the set speed

3.12.3.2

ACC following control sub-state

state in which the system controls the clearance to the target vehicle according to the selected time gap

3.13

target vehicle

vehicle that the subject vehicle follows

3.14

stationary object

object in front of the subject vehicle which is stationary

4 Symbols and abbreviated terms

4.1 Symbols

See Table 1.

Table 1 — Symbols and meanings

Symbol	Meaning
A	Utilized area, general for area
A_t	Illuminated surface
$a_{\text{lateral_max}}$	Maximum allowed lateral acceleration in curves
a_{min}	Minimum allowed longitudinal acceleration = maximum allowed longitudinal deceleration
a_{max}	Maximum allowed longitudinal acceleration
a_{test}	Maximum allowed acceleration during curve test
$a_{\text{vehicle_max}}$	Maximum possible deceleration capability during manual driving
c	Clearance, inter-vehicle distance
d	Distance between object and sensor, general for distance
d_0	Distance below which detection of a target vehicle is not required
d_1	Distance below which neither distance measurement nor determination of relative speed is required
d_2	Distance for measurement purpose
d_A	Distance between source and projected plane A
d_{max}	Maximum detection range on straight roads
$d_{\text{max_curve}}$	Maximum detection range on curves
E_t	Intensity of irradiation out of transmitter
I_0	Radiated intensity
I_{ref}	Radiated intensity in a given direction
L	Length of a side of a radar test reflector