



SLOVENSKI STANDARD

SIST EN 60534-9:2008

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Regulacijski ventili za industrijske procese - 9. del: Preskusni postopki za meritve odziva na stopnico (IEC 60534-9:2007)

Industrial-process control valves -- Part 9: Test procedure for response measurements from step inputs

Stellventile für die Prozessregelung -- Teil 9: Prüfverfahren zur Bestimmung des Verhaltens von Stellventilen bei Sprungfunktionen

Vannes de régulation des processus industriels -- Partie 9: Procédure d'essai pour la mesure de la réponse des vannes de régulation à des signaux d'entrée échelonnés

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Ta slovenski standard je istoveten z: EN 60534-9:2007

ICS:

23.060.40	V æ } ã^* ~ æf !lä	Pressure regulators
25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control

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EUROPEAN STANDARD

EN 60534-9

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2007

ICS 23.060; 25.040.40

English version

**Industrial-process control valves -
Part 9: Test procedure for response measurements from step inputs
(IEC 60534-9:2007)**

Vannes de régulation
des processus industriels -
Partie 9: Procédure d'essai
pour la mesure de la réponse
des vannes de régulation
à des signaux d'entrée échelonnés
(CEI 60534-9:2007)

Stellventile für die Prozessregelung -
Teil 9: Prüfverfahren zur Bestimmung
des Verhaltens von Stellventilen
bei Sprungfunktionen
(IEC 60534-9:2007)

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This European Standard was approved by CENELEC on 2007-10-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 65B/632/FDIS, future edition 1 of IEC 60534-9, prepared by SC 65B, Devices & process analysis, of IEC TC 65, Industrial-process measurement, control and automation, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60534-9 on 2007-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2008-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2010-10-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60534-9:2007 was approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60534-1	– ¹⁾	Industrial-process control valves - Part 1: Control valve terminology and general considerations	EN 60534-1	2005 ²⁾
IEC 60534-4	– ¹⁾	Industrial process control valves - Part 4: Inspection and routine testing	EN 60534-4	2006 ²⁾

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¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

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Edition 1.0 2007-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Industrial-process control valves –
Part 9: Test procedure for response measurements from step inputs**

**Vannes de régulation des processus industriels –
Partie 9: Procédure d'essai pour la mesure de la réponse des vannes de
régulation à des signaux d'entrée échelonnés**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL-PROCESS CONTROL VALVES –

Part 9: Test procedure for response measurements from step inputs

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60534-9 has been prepared by subcommittee 65B: Devices, of IEC technical committee 65: Industrial-process measurement and control.

The text of this standard is based on the following documents:

FDIS	Report on voting
65B/632/FDIS	65B/639/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all the parts of the IEC 60634 series, under the general title *Industrial-process control valves*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INDUSTRIAL-PROCESS CONTROL VALVES –

Part 9: Test procedure for response measurements from step inputs

1 Scope and object

This part of IEC 60534 defines the testing and reporting of the step response of control valves that are used in throttling closed-loop control applications. A control valve consists of the complete, ready-to-use assembly of the control valve body, the actuator, and any required accessories. The most probable accessory is a valve positioner.

NOTE For background, refer to technical report ANSI/ISA-TR75.25.02 [6]¹.

The object of this standard is to define how to test, measure, and report control valve response characteristics in an open-loop environment. This information can be used for process control applications to determine how well and how fast the control valve responds to the control valve input signal.

This standard does not define the acceptable control valve performance for process control nor does it restrict the selection of control valves for any application. If this standard is used for evaluation or acceptance testing, the parties may agree to documented variations from these requirements.

The information using the defined test methods is specifically applicable to closed-loop feedback control but may have some application to open-loop control applications. It does not address valves used in on-off control service.

Tests specified in this standard may not be sufficient to measure the performance required for all applications. Not all control valve applications will require this testing.

2 Normative references

The following 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.

IEC 60534-1, *Industrial-process control valves – Part 1: Control valve terminology and general consideration*

IEC 60534-4, *Industrial-process control valves – Part 4: Inspection and routine testing*

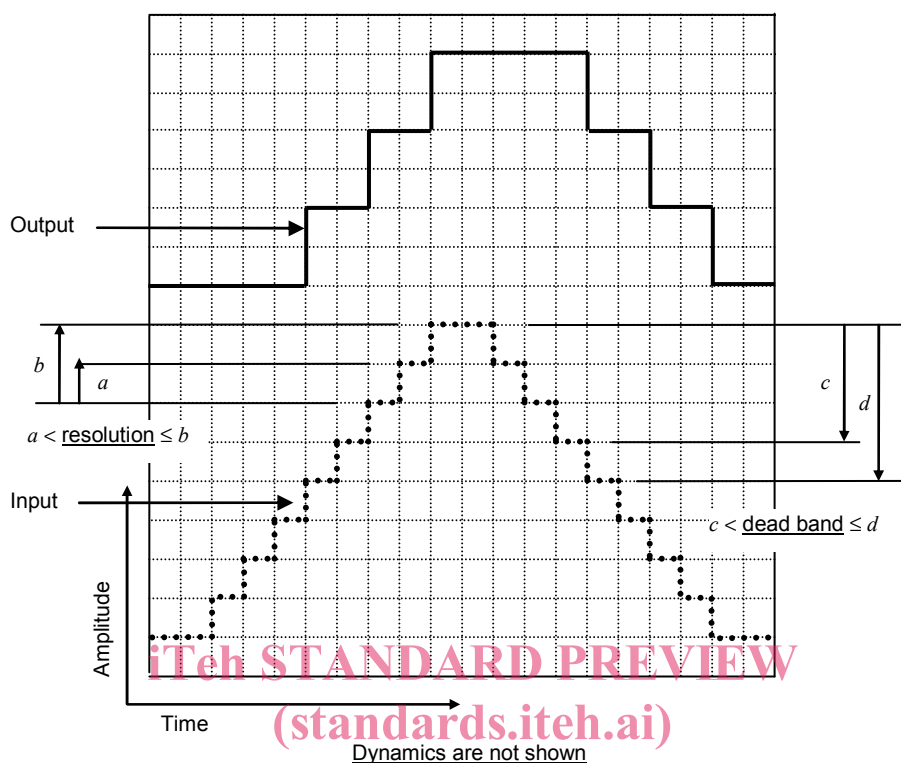
3 Terms and definitions

For the purposes of this document, the following terms and definitions, as well as those given in IEC 60534-1 and other parts of IEC 60534, apply.

NOTE 1 In the specific area of non-linear dynamics, it was determined that some terms defined in IEC 60050-351 or in [5] lacked the precision desired for these documents. Others were inconsistent with the terminology used in the non-linear control literature.

¹ Figures in square brackets refer to the Bibliography.

NOTE 2 Reference [6] explains applicable terms and explores control valve static and dynamic response characteristics important for process control. That information will aid correct interpretation and application of the test results obtained from the tests defined in this standard.



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Figure 1 – Dead band and resolution

3.1 closed-loop time constant

time constant of the closed-loop response of a control loop, used in tuning methods such as Internal Model Control (IMC) and Lambda Tuning and is a measure of the performance of a control loop

3.2 dead band

finite range of values within reversal of the input variable does not produce any noticeable change in the output variable

[IEC 60534-4, 3.2]

3.3 dead time

time interval between the instant when a variation of an input variable is produced and the instant when the consequent variation of the output variable starts

3.4 dynamic response

time-dependent output signal change resulting from a defined time-dependent input signal change

NOTE Commonly used input signal changes include impulse, pulse, step, ramp, and sinusoid [4]. Dynamic means that the control valve is moving. Dynamic response can be measured without process loading in bench-top tests, with simulated or active loading in a flow laboratory or under normal process operating conditions.