SLOVENSKI STANDARD
SIST EN 60534-2-3:1998

01-november-1998

Industrial-process control valves - Part 2-3: Flow capacity - Test procedures (IEC 60534-2-3:1997)

Industrial-process control valves -- Part 2-3: Flow capacity - Test procedures

Stellventile für die Prozeßregelung -- Teil 2-3: Durchflußkapazität - Prüfverfahren

Vannes de régulation des processus industriels -- Partie 2-3: Capacité d'écoulement - Procédures d'essais

Ta slovenski standard je istoveten z: EN 60534-2-3:1998

ICS:

23.060.40	Tlačni regulatorji	Pressure regulators
25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control

SIST EN 60534-2-3:1998 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60534-2-3

February 1998

UDC 621.646.2-553.4:681.523:681.533.38:620.1
ICS 23.060.40

Supersedes EN 60534-2-3:1993

Descriptors: Industrial-process, control valves, flow coefficient, test procedures of flow coefficient for control valves

English version

Industrial-process control valves
Part 2-3: Flow capacity - Test procedures
(IEC 60534-2-3:1997)

Vannes de régulation des processus industriels
Partie 2-3: Capacité d'écoulement - Procédures d'essais
(CEI 60534-2-3:1997)

Stellventile für die Prozeßregelung
Teil 2-3: Durchflußkapazität - Prüfverfahren
(IEC 60534-2-3:1997)

This European Standard was approved by CENELEC on 1998-01-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and 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/319/FDIS, future edition 2 of IEC 60534-2-3, prepared by SC 65B, Devices, of IEC TC 65, Industrial-process measurement and control, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60534-2-3 on 1998-01-01.

This European Standard supersedes EN 60534-2-3:1993.

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) 1998-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-10-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A and ZA are normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60534-2-3:1997 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

Publication	Year	Title	EN/HD	Year
IEC 60534-1	1987	Industrial-process control valves Part 1: Control valve terminology and general considerations	EN 60534-1	1993
IEC 60534-2-1	1978	Part 2: Flow capacity Section 1: Sizing equations for incompressible fluid flow under installed conditions	EN 60534-2-1	1993
IEC 60534-2-2	1980	Part 2: Flow capacity Section 2: Sizing equations for compressible fluid flow under installed conditions	EN 60534-2-2	1993
IEC 60534-8-2	1991	Part 8: Noise considerations Section 2: Laboratory measurement of noise generated by hydrodynamic flow through control valves	EN 60534-8-2	1993
IEC 61298-1	1995	Process measurement and control devices General methods and procedures for evaluating performance Part 1: General considerations	EN 61298-1	1995
IEC 61298-2	1995	Part 2: Tests under reference conditions	EN 61298-2	1995

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC

60534-2-3

Deuxième édition
Second edition
1997-12

Vannes de régulation des processus industriels –

Partie 2-3: Capacité d'écoulement – Procédures d'essai

Industrial-process control valves –

Part 2-3: Flow capacity – Test procedures

International Electrotechnical Commission 3, rue de Varembé Geneva, Switzerland
Telefax: +41 22 919 0300 e-mail: inmail@iec.ch IEC web site http: //www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE T

Pour prix, voir catalogue en vigueur
For price, see current catalogue

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

INDUSTRIAL-PROCESS CONTROL VALVES –

Part 2-3: Flow capacity – Test procedures

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60534-2-3 has been prepared by subcommittee 65B: Devices, of IEC technical committee 65: Industrial-process measurement and control.

The second edition cancels and replaces the first edition published in 1983, of which it constitutes a technical revision.

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

FDIS	Report on voting
65B/319/FDIS	65B/329/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.

Annex A forms an integral part of this standard.

INDUSTRIAL-PROCESS CONTROL VALVES –

Part 2-3: Flow capacity – Test procedures

1 Scope

This section of IEC 60534-2 is applicable to industrial-process control valves and provides the flow capacity test procedures for determining the following variables used in the equations given in IEC 60534-2-1 and IEC 60534-2-2:

a) flow coefficient C;

b) liquid pressure recovery factor without attached fittings F_L;

c) combined liquid pressure recovery factor and piping geometry factor of a control valve with attached fittings F_{LP};

d) piping geometry factor F_p;

e) pressure differential ratio factors x_T and x_{TP};

f) valve style modifier F_d;

g) Reynolds number factor F_R.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 60534-2. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 60534-2 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60534-1:1987, *Industrial-process control valves – Part 1: Control valve terminology and general considerations*

IEC 60534-2:1978, *Industrial-process control valves – Part 2: Flow capacity* – Section One: *Sizing equations for incompressible fluid flow under installed conditions*

IEC 60534-2-2:1980, *Industrial-process control valves – Part 2: Flow capacity* – Section Two: *Sizing equations for compressible fluid flow under installed conditions*

IEC 60534-8-2:1991, *Industrial-process control valves – Part 8: Noise considerations* – Section 2: *Laboratory measurement of noise generated by hydrodynamic flow through control valves*

IEC 61298-1:1995, *Process measurement and control devices – General methods and procedures for evaluating performance – Part 1: General considerations*

IEC 61298-2:1995, *Process measurement and control devices – General methods and procedures for evaluating performance – Part 2: Tests under reference conditions*

3 Definitions

For the purpose of this section of IEC 60534-2, the definitions given in IEC 60534-1, IEC 60534-2, IEC 60534-2-2, IEC 61298-1, and IEC 61298-2 apply.

4 Symbols

Symbol	Description	Unit
C	Flow coefficient (K_v, C_v)	Various (see IEC 60534-1)
C_R	Flow coefficient at rated travel	Various (see IEC 60534-1)
d	Nominal valve size (DN)	mm
F_d	Valve style modifier	1
F_F	Liquid critical pressure ratio factor	1
F_L	Liquid pressure recovery factor of a control valve without attached fittings	1
F_{LP}	Combined liquid pressure recovery factor and piping geometry factor of a control valve with attached fittings	1
F_p	Piping geometry factor	1
F_R	Reynolds number factor	1
F_γ	Specific heat ratio factor	1
M	Molecular mass of flowing fluid	kg/kmol
N	Numerical constants (see table 3)	Various (see note 1)
p_c	Thermodynamic critical pressure	kPa or bar (see note 2)
p_v	Vapour pressure of liquid at inlet temperature	kPa or bar
p_1	Inlet absolute static pressure measured at the upstream pressure tap	kPa or bar
p_2	Outlet absolute static pressure measured at the downstream pressure tap	kPa or bar
Δp	Differential pressure ($p_1 - p_2$) between upstream and downstream pressure taps	kPa or bar
Δp_{max}	Maximum pressure differential	kPa or bar
$\Delta p_{max(L)}$	Maximum effective Δp without attached fittings	kPa or bar
$\Delta p_{max(LP)}$	Maximum effective Δp with attached fittings	kPa or bar
Q	Volumetric flow rate	m^3/h (see note 3)
Q_{max}	Maximum volumetric flow rate (choked flow conditions)	m^3/h
$Q_{max(L)}$	Maximum volumetric flow rate for incompressible fluids (choked flow conditions without attached fittings)	m^3/h
$Q_{max(LP)}$	Maximum volumetric flow rate for incompressible fluids (choked flow conditions with attached fittings)	m^3/h
$Q_{max(T)}$	Maximum volumetric flow rate for compressible fluids (choked flow conditions without attached fittings)	m^3/h
$Q_{max(TP)}$	Maximum volumetric flow rate for compressible fluids (choked flow conditions with attached fittings)	m^3/h
Re_v	Valve Reynolds number	1
T_1	Inlet absolute temperature	K
t_s	Reference temperature for standard conditions	°C

Symbols *(continued)*

Symbol	Description	Unit
x	Ratio of pressure differential to inlet absolute pressure ($\Delta p/p_1$)	1
x_T	Pressure differential ratio factor of a control valve without attached fittings for choked flow	1
x_{TP}	Pressure differential ratio factor of a control valve with attached fittings for choked flow	1
Y	Expansion factor	1
Z	Compressibility factor (Z = 1 for gases that exhibit ideal gas behaviour)	1
γ	Specific heat ratio	1
ν	Kinematic viscosity	m^2/s (see note 4)
ζ	Velocity head loss coefficient of a reducer, expander or other fitting attached to a control valve	1
ρ_1/ρ_0	Relative density (ρ_1/ρ_0 = 1 for water at 15,5 °C)	1

NOTE 1 – To determine the units for the numerical constants, dimensional analysis may be performed on the appropriate equations using the units given in table 3.

NOTE 2 – 1 bar = 10^2 kPa = 10^5 Pa.

NOTE 3 – For compressible fluid volumetric flow rates in m^3/h, identified by the symbol Q, refer to standard conditions which are an absolute pressure of 101,325 kPa (1,013 25 bar) and a temperature of either 0 °C or 15 °C (see table 3).

NOTE 4 – 1 centistoke = 10^{-6} m^2/s.

5 Test system

A basic flow test system is shown in figure 1.

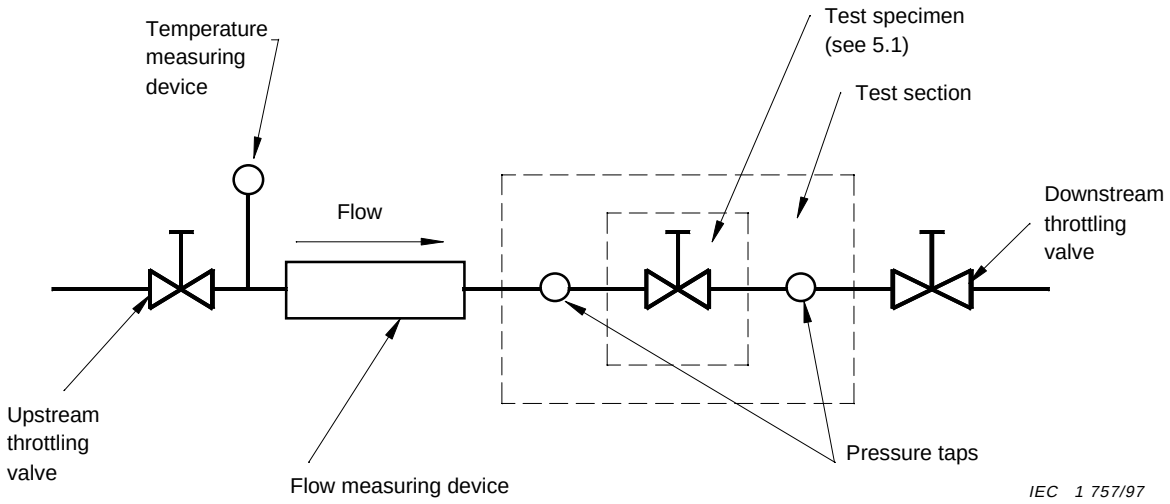

Figure 1 – Basic flow test system