SVENSK STANDARD SS-EN 60534-2-1

Fastställd	Utgåva	Sida	Ansvarig kommitté
2011-09-07	3	1 (1+54)	SEK TK 65

Industriell processtyrning – Reglerventiler – Del 2-1: Flödesberäkningar för inkompressibla medier

Industrial-process control valves –
Part 2-1: Flow capacity –
Sizing equations for fluid flow under installed conditions

Som svensk standard gäller europastandarden EN 60534-2-1:2011. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60534-2-1:2011.

Nationellt förord

Europastandarden EN 60534-2-1:2011

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 60534-2-1, Second edition, 2011 - Industrial-process control valves - Part 2-1: Flow capacity - Sizing equations for fluid flow under installed conditions**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60534-2-1, utgåva 2, 1999, gäller ej fr o m 2014-05-04.

ICS 23.060.40; 25.040.40

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
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Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

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Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60534-2-1

May 2011

ICS 23.060.40; 25.040.40

Supersedes EN 60534-2-1:1998

English version

Industrial-process control valves - Part 2-1: Flow capacity - Sizing equations for fluid flow under installed conditions
(IEC 60534-2-1:2011)

Vannes de régulation des processus industriels -
Partie 2-1: Capacité d'écoulement -
Equations de dimensionnement pour l'écoulement des fluides dans les conditions d'installation
(CEI 60534-2-1:2011)

Stellventile für die Prozessregelung -
Teil 2-1: Durchflusskapazität -
Bemessungsgleichungen für Fluide unter Betriebsbedingungen
(IEC 60534-2-1:2011)

This European Standard was approved by CENELEC on 2011-05-04. 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, Croatia, 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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 60534-2-1:2011 E

Foreword

The text of document 65B/783/FDIS, future edition 2 of IEC 60534-2-1, 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 60534-2-1 on 2011-05-04.

This European Standard supersedes EN 60534-2-1:1998.

EN 60534-2-1:2011 includes the following significant technical changes with respect to EN 60534-2-1:1998:

— the same fundamental flow model, but changes the equation framework to simplify the use of the standard by introducing the notion of Δp_{sizing};

— changes to the non-turbulent flow corrections and means of computing results;

— multi-stage sizing as an Annex.

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

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)	2012-02-04
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-05-04

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60534-2-1:2011 was approved by CENELEC as a European Standard without any modification.

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.

Publication	Year	Title	EN/HD	Year
IEC 60534-1	2005	Industrial-process control valves - Part 1: Control valve terminology and general considerations	EN 60534-1	2005
IEC 60534-2-3	1997	Industrial-process control valves - Part 2-3: Flow capacity - Test procedures	EN 60534-2-3	1998

CONTENTS

INDUSTRIAL-PROCESS CONTROL VALVES –

Part 2-1: Flow capacity – Sizing equations for fluid flow under installed conditions

1 Scope

This part of IEC 60534 includes equations for predicting the flow of compressible and incompressible fluids through control valves.

The equations for incompressible flow are based on standard hydrodynamic equations for Newtonian incompressible fluids. They are not intended for use when non-Newtonian fluids, fluid mixtures, slurries or liquid-solid conveyance systems are encountered. The equations for incompressible flow may be used with caution for non-vaporizing multi-component liquid mixtures. Refer to Clause 6 for additional information.

At very low ratios of pressure differential to absolute inlet pressure ($\Delta p/p_1$), compressible fluids behave similarly to incompressible fluids. Under such conditions, the sizing equations for compressible flow can be traced to the standard hydrodynamic equations for Newtonian incompressible fluids. However, increasing values of $\Delta p/p_1$ result in compressibility effects which require that the basic equations be modified by appropriate correction factors. The equations for compressible fluids are for use with ideal gas or vapor and are not intended for use with multiphase streams such as gas-liquid, vapor-liquid or gas-solid mixtures. Reasonable accuracy can only be maintained when the specific heat ratio, γ, is restricted to the range $1{,}08 < \gamma < 1{,}65$. Refer to Clause 7.2 for more information.

For compressible fluid applications, this standard is valid for valves with $x_T \leq 0{,}84$ (see Table D.2). For valves with $x_T > 0{,}84$ (e.g. some multistage valves), greater inaccuracy of flow prediction can be expected.

Reasonable accuracy can only be maintained for control valves if:

$$\frac{C}{N_{18}d^2} < 0{,}047$$

Note that while the equation structure utilized in this document departs radically from previous versions of the standard, the basic technology is relatively unchanged. The revised equation format was adopted to simplify presentation of the various equations and improve readability of the document.

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.

IEC 60534-1:2005, *Industrial-process control valves – Part 1: Control valve terminology and general considerations*

IEC 60534-2-3:1997, *Industrial-process control valves – Part 2-3: Flow capacity – Test procedures*