SLOVENSKI STANDARD
SIST EN 60654-3:1998

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Operating conditions for industrial-process measurement and control equipment - Part 3: Mechanical influences (IEC 60654-3:1983)

Operating conditions for industrial-process measurement and control equipment -- Part 3: Mechanical influences

Einsatzbedingungen für Meß-, Steuer- und Regeleinrichtungen in der industriellen Prozeßtechnik -- Teil 3: Mechanische Einflüsse

Conditions de fonctionnement pour les matériels de mesure et commande dans les processus industriels -- Partie 3: Influences mécaniques

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25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control

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English version

Operating conditions for industrial-process measurement and control equipment
Part 3: Mechanical influences
(IEC 60654-3:1983)

Conditions de fonctionnement pour les matériels de mesure et commande dans les processus industriels
Partie 3: Influences mécaniques
(CEI 60654-3:1983)

Einsatzbedingungen für Meß-, Steuer- und Regeleinrichtungen in der industriellen Prozeßtechnik
Teil 3: Mechanische Einflüsse
(IEC 60654-3:1983)

This European Standard was approved by CENELEC on 1997-07-01. 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.

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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 the International Standard IEC 60654-3:1983, prepared by SC 65A, System aspects, of IEC TC 65, Industrial-process measurement and control, was approved by CENELEC as HD 413.3 S1 on 1986-02-27.

This Harmonization Document was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 60654-3 on 1997-07-01.

The following date was 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) 1998-06-01

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

Endorsement notice

The text of the International Standard IEC 60654-3:1983 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 60068-2-6	1982	Basic environmental testing procedures Part 2: Tests - Test Fc and guidance: Vibration (Sinusoidal)	HD 323.2.6 S2[1)]	1988
IEC 60721-1	1981[2)]	Classification of environmental conditions - Part 1: Classification of environmental parameters and their severities	-	-
IEC 60721-3-2	1985	Part 3: Classification of groups of environmental parameters and their severities - Transportation	EN 60721-3-2[3)]	1993

1) HD 323.2.6 S2 is superseded by EN 60068-2-6:1995, which is based on IEC 60068-2-6:1995.

2) IEC 60721-1:1990 + A1:1992 are harmonized as EN 60721-1:1995.

3) EN 60721-3-2 is superseded by EN 60721-3-2:1997, which is based on IEC 60721-3-2:1997.

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Troisième partie:
Influences mécaniques

Operating conditions for industrial-process measurement and control equipment

Part 3:
Mechanical influences

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPERATING CONDITIONS FOR INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL EQUIPMENT

Part 3: Mechanical influences

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by IEC Technical Committee No. 65: Industrial-process Measurement and Control.

It forms Part 3 of IEC Publication 654.

A first draft was discussed at the meeting held in Munich in 1973. Further drafts were discussed at the meetings held in Moscow in 1975 and in Philadelphia in 1979. As a result of this latter meeting, a draft, Document 65(Central Office)22, was submitted to the National Committees for approval under the Six Months' Rule in December 1980. Amendments, Document 65(Central Office)25, were submitted to the National Committees for approval under the Two Months' Procedure in December 1981.

The National Committees of the following countries voted explicitly in favour of publication:

Australia	Egypt	South Africa (Republic of)
Austria	Finland	Sweden
Belgium	France	Switzerland
Brazil	Germany	Turkey
Bulgaria	Israel	Union of Soviet Socialist Republics
Canada	Japan	United Kingdom
Czechoslovakia	Netherlands	Yugoslavia
Denmark	Romania	

Other IEC publications quoted in this standard:

Publications Nos. 68: Basic Environmental Testing Procedures.

68-2-6: Part 2: Tests – Test Fc and Guidance: Vibration (Sinusoidal).

721-1: Classification of Environmental Conditions, Part 1: Classification of Environmental Parameters and their Severities.

721-3-2: Part 3: Application of Classified Environmental Parameters and Their Severities. Clause 2: Transportation. (In preparation.)

OPERATING CONDITIONS FOR INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL EQUIPMENT

Part 3: Mechanical influences

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1. Scope

Part 3 of the standard considers the specific operating conditions of vibration, shock, seismic and mechanical stress conditions to which land-based, and off-shore, industrial-process measurement and control systems or parts of systems may be exposed during operation, storage or transportation. Maintenance and repair conditions are excluded from consideration in this Part 3.

The operating influences considered in this part are limited to those which may directly affect performance of process measurement and control systems. Effects of the specific operating conditions on personnel are not within the scope of this part. The appropriate values of the physical parameters listed here should be used to describe local environments in which equipment is expected to operate, be transported and stored. Only conditions as such are considered; the effects of these conditions on instruments' performance are specifically excluded.

IEC Publication 68: Basic Environmental Testing Procedures gives the basic test conditions for vibration and shock. This part establishes a list of selected limit values for the operating conditions.

Note. – Similar questions are at present being studied by Technical Committee No. 75: Classification of Environmental Conditions. Upon the issue of this committee's publication, the present publication should be reconsidered.

2. Object

The object of Part 3 of the standard is to provide users and suppliers of industrial-process measurement and control systems and parts of such systems with a uniform listing and classification of mechanical influences. The specified conditions to which equipment may be exposed during operation, storage, handling and transportation are included. Conditions for transportation are for equipment parts in suitable packages with appropriate locking and clamping devices to prevent damage, as well as for complete systems mounted in mobile units.

The listed operating conditions are intended to serve as a basis for comprehensive specifications.

One of the purposes of this part is to minimize problems which might result from neglecting considerations of specific operating conditions affecting performance of systems and parts of systems.

An additional purpose of this part is to aid the choice of specific limit values for use in the development of evaluation specifications for industrial-process measurement and control equipment.

3. General

Part 3 of the standard considers the specific operating conditions of vibration, shock, seismic effects, and mechanical stress. The conditions of vibration are classified by severity levels of acceleration and displacement in low and high frequency ranges, and by time of occurrence. For conditions of shock, a list is made of values from which selected combinations can be made to describe the local environment. Seismic effects are not classified but included as Appendix A in which the scales of Richter and Mercalli-Cancani are compared and explained.

While the above results in a large number of possible combinations of operating conditions, this appears to represent the "real world", where predictable relations between types of operating conditions do not exist.

It is recognized that extreme or special mechanical environmental conditions exist where values are greater and/or less than the stated values. Specifications for equipment to operate under special or extreme conditions are a matter for negotiation between supplier and user.

4. Vibrations

The criteria to be used for classifying a vibrational environment for industrial-measurement and control equipment are very dependent on the kind or nature of the equipment such as mass, size, mechanical parts, electronic components, wiring, specific functional sensitivity, etc. As an example, a small mass such as the inside connections to an integrated circuit is not influenced by large amplitude 1 Hz oscillations, whereas high acceleration levels of high frequency vibrations could damage these connections. On the other hand, large masses can be more easily damaged by lower frequency vibrations since they cannot follow the high frequency in practice.

The way we wish to categorize the kind of influence on equipment that is thought to be significant such as, direct damage, long-term damage (fatigue), measurement inaccuracy, etc., should also be taken into account.

Vibration usually has an undesirable effect on industrial-process measurement and control equipment. The degree of this undesirable effect can be expressed by the magnitude of the highest force that might be evoked in some critical part or connection, or can be expressed by the kinetic energy that different masses of an instrument are imparted with and braked off, at any one moment. Or again it could be expressed by the amount of energy imparted per unit of time, in other words, the amount of power.