SLOVENSKI STANDARD

SIST EN 60873:1998

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Methods of evaluating the performance of electrical and pneumatic analogue chart recorders for use in industrial-process control systems (IEC 60873:1986, modified)

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Referenčna številka
SIST EN 60873:1998(en)

EUROPEAN STANDARD EN 60873

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Descriptors: Industrial-process control systems, analogue recorders, electrical recorders, pneumatic recorders, chart recorders, methods of evaluating the performance of recorders

ENGLISH VERSION

Methods of evaluating the performance of electrical and pneumatic analogue chart recorders for use in industrial-process control systems (IEC 873:1986, modified)

Méthodes d'évaluation des performances des enregistreurs analogiques électriques et pneumatiques sur papier diagramme, utilisés dans les systèmes de conduite des processus industriels (CEI 873:1986, modifiée)

Methoden der Beurteilung des Betriebsverhaltens von analogen elektrischen und pneumatischen Streifenschreibern in Systemen der industriellen Prozeßtechnik (IEC 873:1986, modifiziert)

This European Standard was approved by CENELEC on 1993-03-09. 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, 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

Ref. No. EN 60873:1993 E

FOREWORD

At the request of CENELEC Reporting Secretariat SR 65B, HD 504 S1:1988 (IEC 873:1986, modified) was submitted to the CENELEC voting procedure for conversion into a European Standard.

The text of the International Standard together with the common modifications accepted for HD 504 S1:1988 was approved by CENELEC as EN 60873 on 9 March 1993.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1994-03-01
- latest date of withdrawal of conflicting national standards	(dow)	-

Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 873:1986 was approved by CENELEC as a European Standard with agreed common modifications as given below.

CLAUSE	COMMON MODIFICATION
1.	Modify the first sentence "Domaine d'application" of the French version as follows : "La présente norme décrit des méthodes destinées à déterminer les performances de tous les enregistreurs analogiques électriques et pneumatiques sur papier diagramme, fonctionnant à partir d'un signal normalisé, qui peuvent être utilisés dans les systèmes de conduite de processus."
12.	Add new sub-clauses 12.5 and 12.6 as follows : "Sub-clause 12.5 - Permissible overloads wherever relevant. Permissible overloads for indirect active measuring instruments are included in subclause 8.3 of IEC Publication 484 "Indirect acting - Electrical Measuring Instruments" to which reference shall be made. "Sub-clause 12.6 - Voltage tests, insulation resistance tests and other safety requirements wherever relevant." The requirements for the voltage test and insulation resistance test are included in sub-clauses 6.5 and 6.6 of IEC Publication 414 "Safety Requirements for Indicating and Recording Electrical Measuring Instruments and their Accessories", to which reference shall be made."

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

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

IEC Publication	Date	Title	EN/HD	Date
50(351)	1975	International Electrotechnical Vocabulary (IEV) - Part 351: Automatic control	-	-
68-2-1	1974	Environmental testing Part 2: Tests - Tests A: Cold	HD 323.2.1 S2*	1987
68-2-2	1974	Tests B: Dry heat	EN 60068-2-2*	1993
68-2-3	1969	Test Ca: Damp heat, steady state	HD 323.2.3 S2*	1987
68-2-6	1982	Test Fc and guidance: Vibration (sinusoidal)	HD 323.2.6 S2*	1988
68-2-14	1984	Test N: Change of temperature	HD 323.2.14 S2*	1987
68-2-31	1969	Test Ec: Drop and topple, primarily for equipment-type specimens	EN 60068-2-31*	1993
160	1963	Standard atmospheric conditions for test purposes	-	-
348	1978	Safety requirements for electronic measuring apparatus	HD 401 S1	1980
381-1	1982	Analogue signals for process control systems - Part 1: Direct current signals	HD 452.1 S1	1984
382	1971	Analogue pneumatic signal for process control systems	-	-

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* HD 323.2.1 S2 is superseded by EN 60068-2-1:1993 + A1:1993 which are based on IEC 68-2-1:1990 + A1:1993
EN 60068-2-2 includes supplement A:1976 to IEC 68-2-2
HD 323.2.3 S2 includes A1:1984 to IEC 68-2-3
HD 323.2.6 S2 includes A1:1983 + A2:1985 to IEC 68-2-6
HD 323.2.14 S2 includes A1:1986 to IEC 68-2-14
EN 60068-2-31 includes A1:1982 to IEC 68-2-31

IEC Publication	Date	Title	EN/HD	Date
414 (mod)	1973	Safety requirements for indicating and recording electrical measuring instruments and their accessories	HD 215 S1	1974
654-3	1983	Operating conditions for industrial-process measurement and control equipment - Part 3: Mechanical influences	HD 413.3 S1	1987
801-3	1984	Electromagnetic compatibility for industrial-process measurement and control equipment - Part 3: Radiated electromagnetic field requirements	HD 481.3 S1	1987

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

NORME DE LA CEI

INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC STANDARD

Publication 873
Première édition — First edition
1986

Méthodes d'évaluation des performances des enregistreurs analogiques électriques et pneumatiques sur papier diagramme, utilisés dans les systèmes de conduite des processus industriels

Methods of evaluating the performance of electrical and pneumatic analogue chart recorders for use in industrial-process control systems

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

METHODS OF EVALUATING THE PERFORMANCE OF ELECTRICAL AND PNEUMATIC ANALOGUE CHART RECORDERS FOR USE IN INDUSTRIAL-PROCESS CONTROL SYSTEMS

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 Sub-Committee 65B: Elements of Systems, of IEC Technical Committee No. 65: Industrial-process Measurement and Control.

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

Six Months' Rule	Report on Voting
65B(CO)40	65B(CO)46

Further information can be found in the Report on Voting indicated in the table above.

The following IEC publications are quoted in this standard:

Publications Nos. 50(351)(1975): International Electrotechnical Vocabulary (IEV), Chapter 351: Automatic Control.

68 — : Basic Environmental Testing Procedures.
68-2-1 (1974): Part 2: Tests — Tests A: Cold.
68-2-2 (1974): Tests B: Dry Heat.
68-2-3 (1969): Test Ca: Damp Heat, Steady State.
68-2-6 (1982): Test Fc and Guidance: Vibration (Sinusoidal).
68-2-14 (1984): Test N: Change of Temperature.
68-2-31 (1969): Test Ec: Drop and Topple, Primarily for Equipment-type Specimens.
160 (1963): Standard Atmospheric Conditions for Test Purposes.
278 (1968): Documentation to be Supplied with Electronic Measuring Apparatus.
348 (1978): Safety Requirements for Electronic Measuring Apparatus.
381-1 (1982): Analogue Signals for Process Control Systems.
382 (1971): Analogue Pneumatic Signal for Process Control Systems.
414 (1973): Safety Requirements for Indicating and Recording Electrical Measuring Instruments and their Accessories.
654-3 (1983): Operating Conditions for Industrial-process Measurement and Control Equipment, Part 3: Mechanical Influences.
801-3 (1984): Electromagnetic Compatibility for Industrial-process Measurement and Control Equipment, Part 3: Radiated Electromagnetic Field Requirements.

METHODS OF EVALUATING THE PERFORMANCE OF ELECTRICAL AND PNEUMATIC ANALOGUE CHART RECORDERS FOR USE IN INDUSTRIAL-PROCESS CONTROL SYSTEMS

INTRODUCTION

The methods of evaluation specified in this standard are intended for use by manufacturers to determine the performance of their products and by users or independent testing establishments to verify manufacturers' performance specifications.

The test conditions in this standard, for example the range of ambient temperatures and power supply, represent those which commonly arise in use. Consequently, the values specified herein shall be used where no other values are specified by the manufacturer.

The tests specified in this standard are not necessarily sufficient for instruments specifically designed for unusually arduous duties. Conversely, a restricted series of tests may be suitable for instruments designed to perform within a more limited range of conditions.

It will be appreciated that the closest communication should be maintained between the evaluating body and the manufacturer. Note shall be taken of the manufacturer's specifications for the instrument when the test programme is being decided, and the manufacturer should be invited to comment on both the test programmes and the results.

1. Scope

This standard provides methods for determining the performance of all electrical and pneumatic analogue chart recorders operating from a standardized signal which may be used in process control. It is intended that continuous and dotted line traces, multiple-pen and multiple-channel instruments should be covered. Some tests shall not apply to all instruments and additional tests may be required for certain types of recorders.

2. Object

This standard is intended to specify uniform methods of test for the evaluation of the performance of electrical and pneumatic analogue chart recorders operating from a standardized signal which may be used in process control.

When a full evaluation in accordance with this standard is not required, those tests which are required shall be performed and the results reported in accordance with those parts of the standard which are relevant.

3. Definitions

For the purpose of this standard, the definitions below shall apply until final definitions of these terms are published in a new edition of IEC Publication 50(351): International Electrotechnical Vocabulary (IEV), Chapter 351: Automatic Control.

3.1 *Conformity*

The conformity of a curve consists in the closeness by which it approximates to a specified curve (e.g., linear, logarithmic, parabolic, cubic, square root, etc.).

Notes 1. — It is usually measured in terms of non-conformity and expressed as conformity, for example, the maximum deviation between an average curve and a specified curve. The average curve is determined after making two or more full-range traverses in each direction. The value of conformity is referred to the output span unless otherwise stated.

2. — As a performance specification, conformity may be expressed as independent conformity, terminal-based conformity or zero-based conformity.

3. — Linearity is a specific, frequently encountered case of conformity where the specified curve is a straight line.

3.2 *Conformity, independent*

The maximum deviation of the actual characteristic (average of upscale and downscale readings) from a specified curve, so positioned as to minimize the maximum deviation.

3.3 *Conformity, terminal-based*

The maximum deviation of the actual characteristic (average of upscale and downscale readings) from a specified curve coinciding with the actual characteristic at upper and lower range-values.

3.4 *Conformity, zero-based*

The maximum deviation of the actual characteristic (average of upscale and downscale readings) from a specifed curve so positioned as to coincide with the actual characteristic at the lower range-value and to minimize the maximum deviation.

3.5 *Dead band*

The largest change in input that can be effected without causing a detectable change in output.

3.6 *Friction effect*

In the case of continuous line recorders, it is the effect which friction of the marking device on the chart may have on the record.

3.7 *Hysteresis*

That property of an element evidenced by the dependence of the value of the output, for a given excursion of the input, upon the history of prior excursions and the direction of the current traverse (see Figure B2, page 67, and Table BI, page 65).

Note. — This is a common usage definition which includes hysteresis error and dead band. That portion of the difference which is dependent on the history of prior excursion is hysteresis error, while that portion due to dead band may be determined by a conventional dead-band test.

3.8 *Hysteresis error*

That portion of hysteresis due to energy absorption in the elements of a measuring instrument. Unless otherwise specified, it should be determined by subtracting the effect of the dead band from the maximum measured separation between upscale and downscale readings of the measured variable during a full-range traverse.