

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

Metrologiska bedömningsgrunder för icke automatiska vågar

Metrological aspects of non-automatic weighing instruments

Som svensk standard gäller europastandarden EN 45501:2015. Den svenska standarden innehåller den officiella engelska språkversionen av EN 45501:2015.

Denna standard ersätter SS-EN 45501:2015 utgåva 2 fastställd av SIS, vilken inte längre gäller från och med 2025-03-05.

Det tekniska innehållet är identiskt. Endast standardens förstasida och informationssidor är ändrade.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

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.

SEK Svensk Elstandard

Box 1042
172 21 Sundbyberg
Tel 08-444 14 00
elstandard.se

English Version

Metrological aspects of non-automatic weighing instruments

Aspects métrologiques des instruments de pesage à
fonctionnement non automatique

Metrologische Aspekte der nichtselbsttätigen Waagen

This European Standard was approved by CENELEC on 30 June 2014. CEN and 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 CEN-CENELEC Management Centre or to any CEN and 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 CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Foreword	5
Introduction	6
Terminology	7
T.1 General definitions	7
T.2 Construction of an instrument	9
T.3 Metrological characteristics of an instrument	15
T.4 Metrological properties of an instrument	16
T.5 Indications and errors	17
T.6 Influences and reference conditions	22
T.7 Performance test	22
T.8 Index of terms defined	22
T.9 Abbreviations and symbols	24
1 Scope	27
2 Principles of the European Standard	27
2.1 Units of measurement	27
2.2 Principles of the metrological requirements	27
2.3 Principles of the technical requirements	27
2.4 Application of requirements	28
2.5 Terminology	28
3 Metrological requirements	28
3.1 Principles of classification	28
3.2 Classification of instruments	28
3.3 Additional requirements for multi-interval instruments	29
3.4 Auxiliary indicating devices	30
3.5 Maximum permissible errors	32
3.6 Permissible differences between results	33
3.7 Test standards	33
3.8 Discrimination	34
3.9 Variations due to influence quantities and time	34
3.10 Type evaluation tests and examinations	38
4 Technical requirements for self- or semi-self-indicating instruments	43
4.1 General construction requirements	43
4.2 Indication of weighing results	45
4.3 Analog indicating device	46
4.4 Digital indicating devices	48
4.5 Zero-setting and zero-tracking devices	49
4.6 Tare devices	51
4.7 Preset tare devices	54
4.8 Locking positions	55
4.9 Auxiliary verification devices (removable or fixed)	55
4.10 Selection of weighing ranges on a multiple range instrument	55
4.11 Devices for selection (or switching) between various load receptors and/or load transmitting devices and various load measuring devices	56
4.12 "Plus and minus" comparator instruments	56
4.13 Instruments for direct sales to the public	56
4.14 Additional requirements for price-computing instruments for direct sales to the public	58
4.15 Instruments similar to those normally used for direct sales to the public	60
4.16 Price-labeling instruments	60
4.17 Mechanical counting instruments with unit-weight receptor	60
4.18 Additional technical requirements for mobile instruments (see also 3.9.1.1)	61
4.19 Portable instruments for weighing road vehicles	62
4.20 Modes of operation	62
5 Technical requirements for electronic instruments	63

5.1	General requirements	63
5.2	Acting upon significant faults	63
5.3	Functional requirements	63
5.4	Performance and span stability tests	64
5.5	Additional requirements for software-controlled electronic devices	65
6	Technical requirements for non-self-indicating instruments	71
6.1	Minimum sensitivity	71
6.2	Acceptable solutions for indicating devices	71
6.3	Conditions of construction	72
6.4	Simple equal arm beam	73
6.5	Simple 1/10 ratio beam	73
6.6	Simple sliding poise instruments (steelyards)	74
6.7	Roberval and Béranger instruments	75
6.8	Instruments with ratio platforms	75
6.9	Instruments with a load-measuring device having accessible sliding poises (of the steelyard type)	76
7	Marking of instruments and modules	77
7.1	Descriptive Markings	77
7.2	Other marks	80
8	Metrological controls	81
8.1	Liability to metrological controls	81
8.2	Type approval	81
8.3	Verification of conformity to type	81
Annex A	(normative) Testing procedures for non-automatic weighing instruments	83
A.1	Administrative examination (8.2.1)	83
A.2	Compare construction with documentation (8.2.2)	83
A.3	Initial examination	83
A.4	Performance tests	83
A.5	Influence factors	92
A.6	Endurance test (3.9.4.3)	95
Annex B	(normative) Additional tests for electronic instruments	97
B.1	General requirements for electronic instruments under test	97
B.2	Damp heat, steady state	97
B.3	Performance tests for disturbances	97
B.4	Span stability test	104
Annex C	(normative) Testing and Evaluation of indicators and analog data processing devices as modules of non-automatic weighing instruments	106
C.1	Applicable requirements	106
C.2	General principles of testing	107
C.3	Tests	111
C.4	Evaluation Record	114
Annex D	(normative) Testing and Evaluation of digital data processing devices, terminals and digital displays as modules of non-automatic weighing instruments	116
D.1	Applicable requirements	116
D.2	General principles of testing	117
D.3	Tests	117
D.4	Evaluation record	118
Annex E	(normative) Testing and Evaluation of weighing modules as modules of non-automatic weighing instruments	119
E.1	Applicable requirements	119
E.2	General principles of testing	120
E.3	Tests	120
E.4	Evaluation Record	120
Annex F	(normative) (Mandatory for separately tested modules) Compatibility checking of modules of non-automatic weighing instruments	122
F.1	Weighing instruments	122

F.2	Separately tested load cells.....	123
F.3	Separately tested indicators and analog data processing devices	124
F.4	Compatibility checks for modules with analog output.....	126
F.5	Compatibility checks for modules with digital output	128
F.6	Examples of compatibility checks for modules with analog output	128
Annex G (normative) Additional examinations and tests for software-controlled digital devices and instruments		133
G.1	Devices and instruments with embedded software (5.5.1).....	133
G.2	Personal computers and other devices with programmable or loadable software (5.5.2).....	133
G.3	Data storage devices (5.5.3)	134
G.4	Test record format	135
Annex ZZ (informative) Coverage of Essential Requirements of EC Directives		136
Bibliography		137

Foreword

This document (EN 45501:2015) has been prepared by a Joint CEN/CENELEC Working Group on Non-automatic Weighing Instruments.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-08-13
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2015-08-13

This document supersedes EN 45501:1992.

EN 45501:2015 includes the following significant technical changes with respect to EN 45501:1992:

In preparing this European Standard, EN 45501:1992 which formed the basis of this standard, was considered, but with additions and amendments to take into account the developments in technology which have occurred in the intervening years. Significant changes include, extensions to the EMC immunity requirements to reflect the greater use of wireless technology for many purposes, enhanced specifications for the integrity and security of software and testing regimes to confirm compliance, requirements for portable and mobile instruments, and recognition of the use of modular elements in families of instruments with enhanced testing requirements for both analog and digital modules and systems for confirming the compatibility of modules when combined into a single instrument or system.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive see informative Annex ZZ, which is an integral part of this document.

Introduction

This European Standard has been adapted from the OIML Recommendation R 76-1, Edition 2006, *Non-automatic weighing instruments - Part 1: Metrological and technical requirements - Tests* by a Joint Working Group from CEN and CENELEC. It was elaborated following a standardization request from the Commission of the European Communities to CEN and CENELEC to establish a European Standards related to Council Directive 2009/23/EC on Non-automatic weighing instruments.

Non-automatic weighing instruments

1 Scope

This European Standard specifies the metrological and technical requirements for non-automatic weighing instruments.

It is intended to provide standardized requirements and testing procedures to evaluate the metrological and technical characteristics in a uniform and traceable way.