

Welding consumables - Covered electrodes -  
Determination of the efficiency, metal recovery and  
deposition coefficient (ISO 2401:2018)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 2401:2018 sisaldab Euroopa standardi EN ISO 2401:2018 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 2401:2018 consists of the English text of the European standard EN ISO 2401:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.09.2018.	Date of Availability of the European standard is 12.09.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

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English Version

**Welding consumables - Covered electrodes -  
Determination of the efficiency, metal recovery and  
deposition coefficient (ISO 2401:2018)**

Électrodes enrobées - Détermination de l'efficacité, du  
rendement du métal et du coefficient de dépôt (ISO  
2401:2018)

Schweißzusätze - Umhüllte Stabelektroden -  
Bestimmung der Ausbringung, der Gesamtausbringung  
und des Abschmelzkoeffizienten (ISO 2401:2018)

This European Standard was approved by CEN on 4 September 2018.

CEN 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 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 member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

## European foreword

This document (EN ISO 2401:2018) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 "Welding and allied processes" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2019, and conflicting national standards shall be withdrawn at the latest by March 2019.

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

This document supersedes EN 22401:1994.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Endorsement notice

The text of ISO 2401:2018 has been approved by CEN as EN ISO 2401:2018 without any modification.

<b>Contents</b>		<b>Page</b>
<b>Foreword</b> .....		<b>iv</b>
<b>1</b>	<b>Scope</b> .....	<b>1</b>
<b>2</b>	<b>Normative references</b> .....	<b>1</b>
<b>3</b>	<b>Terms and definitions</b> .....	<b>1</b>
<b>4</b>	<b>Test plates</b> .....	<b>2</b>
	4.1 Number.....	2
	4.2 Specification.....	2
<b>5</b>	<b>Procedure</b> .....	<b>3</b>
<b>6</b>	<b>Calculation of efficiency and metal recovery</b> .....	<b>4</b>
<b>7</b>	<b>Rounding procedure</b> .....	<b>5</b>
<b>8</b>	<b>Calculation of deposition coefficient</b> .....	<b>5</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

Any feedback, question or request for official interpretation related to any aspect of this document should be directed to the Secretariat of ISO/TC 44/SC 3 via your national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html). Official interpretations, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

This second edition cancels and replaces the first edition (ISO 2401:1972), which has been technically revised. The main changes compared to the previous edition are as follows:

- the Scope has been clarified;
- the document has been updated to the latest ISO style, including addition of [Clause 2](#) and subsequent renumbering;
- the term [3.1](#), electrode efficiency has been added;
- [Clause 5](#) has been revised and the option of eight electrodes introduced;
- in [Subclauses 6.1](#) and [6.2](#), the option of eight electrodes has been introduced;
- [Clause 7](#) has been introduced to align with other ISO/TC 44/SC 3 documents;
- in [Clause 8](#), requirements on rounding procedure have been reworked (example deleted).

# Welding consumables — Covered electrodes — Determination of the efficiency, metal recovery and deposition coefficient

## 1 Scope

This document specifies methods for the determination of the efficiency, weld metal recovery and deposition coefficient of covered electrodes.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 80000-1:2009, *Quantities and units — Part 1: General*. Corrected by ISO 80000-1:2009/Cor 1:2011

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### electrode efficiency

ratio of the mass of weld metal deposited, under standard conditions, to the mass of core wire consumed

#### 3.1.1

##### nominal electrode efficiency

$R_N$

electrode efficiency (3.1) calculated from the nominal diameter and specific weight of the core wire

Note 1 to entry: The value of  $R_N$  obtained using this document can be very close to the value of  $R_E$ .

Note 2 to entry: Specific weight for non-alloy, fine grained, high strength and creep resisting steels 7,85 gcm<sup>-3</sup>.

#### 3.1.2

##### effective electrode efficiency

$R_E$

electrode efficiency (3.1) determined using the actual mass of core wire consumed

Note 1 to entry: The value of  $R_E$  obtained using this document can be very close to the value of  $R_N$ .

### 3.2

#### overall weld metal recovery

$R_G$

ratio of the mass of weld metal deposited under standard conditions to the total mass of a given electrode tested