BS EN ISO 3580:2017

BSI Standards Publication

Welding consumables — Covered electrodes for manual metal arc welding of creep-resisting steels — Classification

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National foreword

This British Standard is the UK implementation of EN ISO 3580:2017. It supersedes BS EN ISO 3580:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/39, Welding consumables.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2017

ISBN 978 0 580 90103 4

ICS 25.160.20

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2017.

Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 3580

May 2017

ICS 25.160.20

Supersedes EN ISO 3580:2011

English Version

Welding consumables - Covered electrodes for manual metal arc welding of creep-resisting steels - Classification (ISO 3580:2017)

Produits consommables pour le soudage - Électrodes enrobées pour le soudage manuel à l'arc des aciers résistant au fluage - Classification (ISO 3580:2017)

Schweißzusätze - Umhüllte Stabelektroden zum Lichtbogenhandschweißen von warmfesten Stählen - Einteilung (ISO 3580:2017)

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European foreword

This document (EN ISO 3580:2017) 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of an identical text or by endorsement, at the latest by November 2017, and conflicting national standards shall be withdrawn at the latest by November 2017.

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

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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 3580:2017 has been approved by CEN as EN ISO 3580:2017 without any modification.

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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).

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For an explanation on 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 the following URL: 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*.

This fourth edition cancels and replaces the third edition (ISO 3580:2010), which has been technically revised with the following changes:

— the normative references have been updated;

— new classifications from the USA and Japan have been added in system B;

— revisions/corrections of chemical compositions and other values have been made in the tables;

— Footnote d) to Table 1 has been revised to clarify that elements intentionally added that do not have values listed (including Co and B) are to be reported;

— the descriptions in Table 3 have been revised;

— the range for nominal electrode efficiency for symbol 4 in Table 4 has been corrected.

Requests for official interpretations of 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.

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Introduction

This document proposes a method for classification of covered electrodes, in terms of chemical composition of the all-weld metal (system A) and in terms of tensile strength and chemical composition (system B).

The mechanical properties of all-weld metal test specimens used to classify the electrodes vary from those obtained in production joints because of differences in welding procedure such as electrode diameter, width of weave, welding position and material composition.

The classification according to system A is mainly based on EN 1599[1]. The classification according to system B is mainly based upon standards used around the Pacific Rim.

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INTERNATIONAL STANDARD ISO 3580:2017(E)

Welding consumables — Covered electrodes for manual metal arc welding of creep-resisting steels — Classification

1 Scope

This document specifies requirements for classification of covered electrodes, based on the all-weld metal in the heat-treated condition, for manual metal arc welding of ferritic and martensitic creep-resisting and low alloy elevated temperature steels.

This document is a combined specification for classification utilizing a system based upon the chemical composition of the all-weld metal, with requirements for the yield strength and impact energy of the all-weld metal, or utilizing a system based upon the tensile strength and the chemical composition of the all-weld metal.

a) Paragraphs and tables which carry the suffix letter "A" are applicable only to electrodes classified to the system based upon chemical composition, with requirements for the yield strength and impact energy of the all-weld metal under this document.

b) Paragraphs and tables which carry the suffix letter "B" are applicable only to electrodes classified to the system based upon the tensile strength and the chemical composition of all-weld metal under this document.

c) Paragraphs and tables which do not have either the suffix letter "A" or the suffix letter "B" are applicable to all covered electrodes classified under this document.

For comparison purposes, some tables include requirements for electrodes classified according to both systems, placing individual electrodes from the two systems, which are similar in composition and properties, on adjacent lines in the particular table. In a particular line of the table that is mandatory in one system, the symbol for the similar electrode from the other system is indicated in parentheses. By appropriate restriction of the formulation of a particular electrode, it is often, but not always, possible to produce an electrode that can be classified in both systems, in which case the electrode, and/or its packaging, can be marked with the classification in either or both systems.

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 544, *Welding consumables — Technical delivery conditions for filler materials and fluxes — Type of product, dimensions, tolerances and markings*

ISO 2401, *Covered electrodes — Determination of the efficiency, metal recovery and deposition coefficient*

ISO 3690, *Welding and allied processes — Determination of hydrogen content in arc weld metal*

ISO 6847, *Welding consumables — Deposition of a weld metal pad for chemical analysis*

ISO 6947, *Welding and allied processes — Welding positions*

ISO 13916, *Welding — Guidance on the measurement of preheating temperature, interpass temperature and preheat maintenance temperature*

ISO 14344, *Welding consumables — Procurement of filler materials and fluxes*

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ISO 15792-1:2000, *Welding consumables — Test methods — Part 1: Test methods for all-weld metal test specimens in steel, nickel and nickel alloys*. Amended by ISO 15792-1:2000/Amd 1:2011

ISO 15792-3, *Welding consumables — Test methods — Part 3: Classification testing of positional capacity and root penetration of welding consumables in a fillet weld*

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

3 Terms and definitions

No terms and definitions are listed in this document.

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Classification

Classification designations are based upon two approaches to indicate the composition and properties of the all-weld metal obtained with a given electrode. The two designation approaches include additional designators for some other classification requirements, but not all. In most cases, a given commercial product can be classified in both systems. Then either or both classification designations can be used for the product.

The classification includes all-weld metal properties obtained with a covered electrode as given in 4A and 4B. The classification is based on the electrode size 4,0 mm with the exception of the symbol for welding position which is based on ISO 15792-3.

4A Classification by chemical composition

The classification is divided into six parts.

1) The first part gives a symbol indicating the product/process to be identified.

2) The second part gives a symbol indicating the chemical composition of the all-weld metal (see Table 1).

3) The third part gives a symbol indicating the type of electrode covering (see 5.4A).

4) The fourth part gives a symbol indicating the nominal electrode efficiency and type of current (see Table 4A).

5) The fifth part gives a symbol indicating the welding position (see Table 5A).

6) The sixth part gives a symbol indicating the hydrogen content of the deposited metal (see Table 6).

In order to facilitate the use of this document, the classification is split into two sections.

4B Classification by tensile strength and chemical composition

The classification is divided into five parts.

1) The first part gives a symbol indicating the product/process to be identified.

2) The second part gives a symbol indicating the strength of the all-weld metal (see Table 2).

3) The third part gives a symbol indicating the type of electrode covering, the type of current, and the welding position (see Table 3B).

4) The fourth part gives a symbol indicating the chemical composition of all-weld metal (see Table 1).

5) The fifth part gives a symbol indicating the hydrogen content of deposited metal (see Table 6).

In order to facilitate the use of this document, the classification is split into two sections.

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a) Compulsory section

This section includes the symbols for the type of product, the chemical composition and the type of covering, i.e. the symbols defined in 5.1, 5.2 and 5.4A.

b) Optional section

This section includes the symbols for the nominal electrode efficiency, the type of current, the welding positions for which the electrode is suitable, and the symbol for hydrogen content, i.e. the symbols defined in 5.5A, 5.6A and 5.7.

a) Compulsory section

This section includes the symbols for the type of product, the strength, the type of covering, the type of current, the welding position, and the chemical composition, i.e. the symbols defined in 5.1, 5.2, 5.3B, 5.4B and 5.6B.

b) Optional section

This section includes the symbol for the hydrogen content, i.e. the symbol defined in 5.7.

The full designation (see Clause 11) shall be used on packages and in the manufacturer's literature and data sheets. The designation system is shown in Annex A for both systems.

5 Symbols and requirements

5.1 Symbol for the product/process

The symbol for the covered electrode used in the manual metal arc welding process shall be the letter E.

5.2 Symbol for the chemical composition of all-weld metal

The symbols in Table 1 indicate the chemical composition of all-weld metal determined in accordance with Clause 7. See Annex B and Annex C for descriptions of the symbols used for chemical composition in system A and in system B, respectively.

5.3 Symbol for the mechanical properties of all-weld metal

5.3A Classification by chemical composition

No symbol shall be used for the mechanical properties of the all-weld metal. The all-weld metal obtained using the covered electrodes listed in Table 1 in accordance with Clause 6 shall also fulfil the mechanical property requirements specified in Table 2.

5.3B Classification by tensile strength and chemical composition

The symbol for tensile strength shall be 49 for 490 MPa minimum tensile strength, 52 for 520 MPa minimum tensile strength, 55 for 550 MPa minimum tensile strength or 62 for 620 MPa minimum tensile strength. The complete mechanical property requirements that shall be fulfilled by the various compositions are specified in Table 2.

Table 1 — Symbol for chemical composition of all-weld metal

Chemical composition symbol[a] for classification according to		Chemical composition, % (by mass)[b]								
ISO 3580-A[c]	ISO 3580-B	C	Si	Mn	P	S	Cr	Mo	V	Other elements[d]
Mo	(1M3)	0,10	0,80	0,40 to 1,50	0,030	0,025	0,2	0,40 to 0,70	0,03	—
(Mo)	1M3	0,12	0,80	1,00	0,030	0,030	—	0,40 to 0,65	—	—
MoV	—	0,03 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,30 to 0,60	0,80 to 1,20	0,25 to 0,60	—
CrMo0,5	(CM)	0,05 to 0,12	0,80	0,40 to 1,50	0,030	0,025	0,40 to 0,65	0,40 to 0,65	—	—

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