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**Welding consumables — Covered  
electrodes for manual metal arc welding  
of non-alloy and fine grain steels —  
Classification**

*Produits consommables pour le soudage — Électrodes enrobées pour  
le soudage manuel à l'arc des aciers non alliés et des aciers à grains  
fins — Classification*



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Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 2560 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

This third edition cancels and replaces the second edition (ISO 2560:2002), which has been technically revised.

Requests for official interpretations of any aspect of this International Standard 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](http://www.iso.org).

## Introduction

This International Standard recognizes that there are two somewhat different approaches in the global market to classifying a given electrode, and allows for either or both to be used, to suit a particular market need. Application of either type of classification designation (or of both, where suitable) identifies a product as classified in accordance with this International Standard. The classification in accordance with system A is mainly based on EN 499:1994<sup>[1]</sup>. The classification in accordance with system B is mainly based upon standards used around the Pacific Rim.

This International Standard provides a classification in order to designate covered electrodes in terms of the yield strength, tensile strength and elongation of the all-weld metal. The ratio of yield strength to tensile strength of weld metal is generally higher than that of parent metal. Users should note that matching weld metal yield strength to parent metal yield strength does not necessarily ensure that the weld metal tensile strength matches that of the parent metal. Therefore, where the application requires matching tensile strength, selection of the consumable should be made by reference to column 3 of Table 1A or to Table 1B and Table 8B.

It should be noted that 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 size, width of weave, welding position, welding current, interpass temperature and parent metal composition.

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# Welding consumables — Covered electrodes for manual metal arc welding of non-alloy and fine grain steels — Classification

## 1 Scope

This International Standard specifies requirements for classification of covered electrodes and deposited metal in the as-welded condition and in the post-weld heat-treated condition for manual metal arc welding of non-alloy and fine grain steels with a minimum yield strength of up to 500 MPa or a minimum tensile strength of up to 570 MPa.

This International Standard is a combined specification providing for classification utilizing a system based upon the yield strength and the average impact energy of 47 J of all-weld metal, or utilizing a system based upon the tensile strength and the average impact energy of 27 J of all-weld metal.

- a) Paragraphs and tables which carry the suffix letter “A” are applicable only to covered electrodes classified to the system based upon the yield strength and the average impact energy of 47 J of all-weld metal in this International Standard.
- b) Paragraphs and tables which carry the suffix letter “B” are applicable only to covered electrodes classified to the system based upon the tensile strength and the average impact energy of 27 J of all-weld metal in this International Standard.
- 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 in this International Standard.

## 2 Normative references

The following referenced documents are indispensable for the application 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 welding filler materials — 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 ferritic steel arc weld metal*

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

ISO 6947, *Welds — Welding positions*

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

ISO 14344, *Welding and allied processes — Procurement of welding consumables*

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

ISO 15792-3:2000, *Welding consumables — Test methods — Part 3: Classification testing of positional capacity and root penetration of welding consumables in a fillet weld* (as amended by ISO 15792-3:2000/Cor.1:2006)

ISO 80000-1, *Quantities and units — Part 1: General*

### 3 Classification

Classification designations are based upon two approaches to indicate the tensile properties and the impact 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, as is clear from the following subclauses. 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 below. The classification is based on an electrode size of 4,0 mm, with the exception of the symbol for welding position, which is based on ISO 15792-3. Where the defined diameter has not been manufactured, the closest diameter to 4,0 mm shall be used for all-weld metal tests.

#### 3A Classification by yield strength and 47 J impact energy

The classification is divided into eight 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 and elongation of all-weld metal (see Table 1A);
- 3) the third part gives a symbol indicating the impact properties of all-weld metal (see Table 2A);
- 4) the fourth part gives a symbol indicating the chemical composition of all-weld metal (see Table 3A);
- 5) the fifth part gives a symbol indicating the type of electrode covering (see 4.5A);
- 6) the sixth part gives a symbol indicating the nominal electrode efficiency and type of current (see Table 5A);
- 7) the seventh part gives a symbol indicating the welding position (see Table 6A);
- 8) the eighth part gives a symbol indicating the diffusible hydrogen content of the deposited metal (see Table 7).

#### 3B Classification by tensile strength and 27 J impact energy

The classification is divided into seven 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 all-weld metal (see Table 1B);
- 3) the third part gives a symbol indicating the type of electrode covering, the type of current, and the welding position (see Table 4B);
- 4) the fourth part gives a symbol indicating the chemical composition of all-weld metal (see Table 3B);
- 5) the fifth part gives a symbol indicating the condition of post-weld heat treatment under which the all-weld metal test was conducted (see 4.6B);
- 6) the sixth part gives a symbol indicating that the electrode has satisfied a requirement for 47 J impact energy at the temperature normally used for the 27 J requirement;
- 7) the seventh part gives a symbol indicating the diffusible hydrogen content of the deposited metal (see Table 7).