

Welding consumables — Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high-strength steels — Classification

The European Standard EN ISO 18276:2006 has the status of a British Standard

ICS 25.160.20

National foreword

This British Standard is the official English language version of EN ISO 18276:2006. It is identical with ISO 18276:2005. It supersedes BS EN 12535:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/39, Welding consumables, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN ISO title page, the EN ISO foreword page, the ISO title page, pages ii to v, a blank page, pages 1 to 23 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2006

© BSI 2006

English Version

Welding consumables - Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high-strength steels - Classification (ISO 18276:2005)

Produits consommables pour le soudage - Fils-électrodes fourrés pour le soudage à l'arc avec ou sans gaz de protection des aciers à haute résistance - Classification (ISO 18276:2005)

Schweißzusätze - Fülldrahtelektroden zum Metall-Schutzgasschweißen mit und ohne Schutzgas von hochfesten Stählen - Einteilung (ISO 18276:2005)

This European Standard was approved by CEN on 2 June 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of ISO 18276:2005 has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 18276:2006 by Technical Committee CEN/TC 121 "Welding", 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 December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

This document supersedes EN 12535:2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 18276:2005 has been approved by CEN as EN ISO 18276:2006 without any modifications.

**Welding consumables — Tubular cored
electrodes for gas-shielded and non-gas-
shielded metal arc welding of high-
strength steels — Classification**

*Produits consommables pour le soudage — Fils-électrodes fourrés pour
le soudage à l'arc avec ou sans gaz de protection des aciers à haute
résistance — Classification*



Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Classification	2
4 Symbols and requirements	4
4.1 Symbol for the product/process	4
4.2 Symbol for tensile properties of all-weld metal	4
4.3 Symbol for impact properties of all-weld metal	4
4.4 Symbol for chemical composition of all-weld metal	5
4.5 Symbol for type of electrode core or the usability characteristics of the electrodes	8
4.6 Symbol for shielding gas	9
4.7 Symbol for welding position	9
4.8 Symbol for hydrogen content of deposited metal	10
4.9 Symbol for conditions of post-weld heat treatment	10
4.10 Rounding-off procedure	10
5 Mechanical tests	10
5.1 Preheating and interpass temperatures	11
5.2 Pass sequence	12
5.3 Post-weld heat treatment (PWHT) condition	12
6 Chemical analysis	13
7 Fillet weld test	13
8 Retest	14
9 Technical delivery conditions	14
10 Examples of designations	14
Annex A (informative) Classification systems	16
Annex B (informative) Description of composition designations for electrodes in the classification system based upon tensile strength and average impact energy of 27 J	19
Annex C (informative) Description of types of electrode core in the classification system based upon yield strength and average impact energy of 47 J	20
Annex D (informative) Descriptions of types of usability characteristics in the classification system based upon tensile strength and average impact energy of 27 J	21
Annex E (informative) Notes on hydrogen content	23

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 18276 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

Introduction

This International Standard proposes a classification system for tubular cored electrodes in terms of the tensile properties, impact properties, chemical composition of the all-weld metal, type of electrode core, shielding gas and welding position. The ratio of yield strength to tensile strength of the weld metal is generally higher than that of the parent metal. Users should note that matching weld metal yield strength to parent metal yield strength will not necessarily ensure that the weld metal tensile strength matches that of the parent metal. Where the application requires matching tensile strength, therefore, selection of the consumable should be made by reference to column 3 of Table 1A or Table 1B.

It should be noted that the mechanical properties of all-weld metal test specimens used to classify tubular cored electrodes will differ from those obtained with production joints because of differences in welding procedure such as electrode size, width of weave, welding position and parent metal composition.

The classification in accordance with system A is mainly based on EN 12535:2000, *Welding consumables — Tubular cored electrodes for gas shielded metal arc welding of high strength steels — Classification*. The classification in accordance with system B is mainly based upon standards used around the Pacific Rim.

Requests for official interpretation of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 3 via the user's national standardization body. A complete listing of these bodies can be found at <<http://www.iso.org>>.

Welding consumables — Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high-strength steels — Classification

1 Scope

This International Standard specifies requirements for classification of tubular cored electrodes with or without a gas shield for metal arc welding of high-strength steels in the as-welded condition or in the post-weld heat-treated condition with a minimum yield strength higher than 550 MPa or a minimum tensile strength higher than 590 MPa. One tubular cored electrode can be tested and classified with different shielding gases, if used with more than one.

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

- 1) Subclauses and tables which carry the suffix letter “A” are applicable only to tubular cored electrodes classified under the system based upon the yield strength and an average impact energy of 47 J of the all-weld metal given in this International Standard.
- 2) Subclauses and tables which carry the suffix letter “B” are applicable only to tubular cored electrodes classified under the system based upon the tensile strength and an average impact energy of 27 J of the all-weld metal given in this International Standard.
- 3) Subclauses and tables which do not have either the suffix letter “A” or the suffix letter “B” are applicable to all tubular cored electrodes classified under this International Standard.

It is recognized that the operating characteristics of tubular cored electrodes can be modified by the use of pulsed current but, for the purposes of this International Standard, pulsed current is not used for determining the electrode classification.

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 31-0:1992, *Quantities and units — Part 0: General principles*

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

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 6947:1990, *Welds — Working positions — Definitions of angles of slope and rotation*