DRAFT INTERNATIONAL STANDARD ISO/DIS 6848

ISO/TC **44**/SC **3** Secretariat: **SIS**

Voting begins on **2002-08-15** Voting terminates on **2003-01-15**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Arc welding and cutting — Nonconsumable tungsten electrodes — Classification

[Revision of first edition (ISO 6848:1984)]

Soudage et coupage à l'arc — Électrodes non consommables en tungstène — Classification

ICS 25.160.20

ISO/CEN PARALLEL ENQUIRY

The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6848 was prepared by Technical Committee ISO/TC 44, *Welding and Allied Processes*, Subcommittee SC 3, *Welding Filler Metals*.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

Introduction

Tungsten electrodes are employed in a variety of welding and allied processes, including inert gas metal arc welding, plasma arc welding and cutting, plasma spraying, and atomic hydrogen welding. In contrast to most other welding electrodes, tungsten electrodes are not intended to become part of the weld deposit. Nevertheless, the chemical composition of a tungsten electrode has an important effect on its range of usage in welding and allied processes. Therefore, tungsten electrodes are classified according to their chemical composition.

Arc welding and cutting — Nonconsumable tungsten electrodes — Classification

1 Scope

This International Standard specifies requirements for classification of nonconsumable tungsten electrodes for inert gas shielded arc welding, and for plasma welding, cutting and thermal spraying.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of ISO maintain registers of currently valid International Standards.

ISO 544 Welding consumables - Technical delivery conditions for welding filler metals - Type of product, dimensions, tolerances and marking

3 Classification

Classification of a tungsten electrode is based upon its chemical composition.

4 Symbols and requirements

4.1 Symbol for the product/process

The symbol for the gas shielded tungsten arc processes is the letter W.

4.2 Symbol for the chemical composition

The symbol for the chemical composition of the tungsten electrode is the chemical symbol for the principal oxide additive followed by digits indicating the nominal weight percent of the oxide additive multiplied by 10. If there is no additive, the symbol is the letter P. Table 1 lists the composition requirements for the various classifications. Compositions not listed in Table 1 shall be symbolised by the letters WG, followed by the chemical symbol and digits for the major oxide addition, according to the principle used for the other compositions given in Table 1.

5 Marking

In accordance with Table 1, tungsten electrodes shall be marked on the basis of their chemical composition, with one, or, possibly, two, colour ring(s) near one end of the electrode. The width of each colour ring shall be at least 3 mm. Alternately, tungsten electrodes may have their classification symbols etched in the surface of the electrode near at least one end of the electrode.

Table 1 — Chemical composition requirements for tungsten electrodes

Classification symbol	Chemical composition requirements				Colour code, RGB colour value and colour sample[1)]
	Oxide addition		Impurities, weight percent	Tungsten, weight percent	
	Principal oxide	Weight percent			
WP	None	N.A.[2)]	0,5	99,5 min.	Green #008000
WCe 20	CeO_2	1,8 to 2,2	0,5	Balance	Grey #808080
WLa 10	La_2O_3	0,8 to 1,2	0,5	Balance	Black #000000
WLa 15	La_2O_3	1,3 to 1,7	0,5	Balance	Gold #FFD700
WLa 20	La_2O_3	1,8 to 2,2	0,5	Balance	Blue #0000FF
WTh 10	ThO_2	0,8 to 1,2	0,5	Balance	Yellow #FFFF00
WTh 20	ThO_2	1,7 to 2,2	0,5	Balance	Red #FF0000
WTh 30	ThO_2	2,8 to 3,2	0,5	Balance	Violet #EE82EE
WZr 3	ZrO_2	0,15 to 0,50	0,5	Balance	Brown #A52A2A
WZr 8	ZrO_2	0,7 to 0,9	0,5	Balance	White #FFFFFF

[1)] RGB colour values and colour samples can be found at the following website:

http://msdn.microsoft.com/library/default.asp?url=/workshop/author/dhtml/reference/colors/colors.asp

[2)] N.A. = Not applicable

6 Standard sizes and tolerances

6.1 Electrode diameters

Standard electrode diameters and tolerances are given in Table 2. Other diameters and tolerances may be as agreed between supplier and purchaser.

Table 2 — Standard electrode diameters and tolerances

Diameter, mm	Tolerance, mm
0,254	± 0,025
0,300	± 0,025
0,50	± 0,05
1,0	± 0,05
1,52	± 0,05
1,6	± 0,05
2,0	± 0,05
2,4	± 0,1
2,5	± 0,1
3,0	± 0,1
3,2	± 0,1
4,0	± 0,1
4,8	± 0,1
5,0	± 0,1
6,3	± 0,1
6,4	± 0,1
8,0	± 0,1
10,0	± 0,1

6.2 Electrode lengths

Standard electrode lengths and tolerances are given in Table 3. Other lengths and tolerances may be as agreed between supplier and purchaser.

6.3 Electrode straightness

Electrodes shall not deviate from straight by more than 0.5 mm over any 100 mm of length or less.

7 Electrode quality

Electrodes shall be supplied with a ground surface finish along the length. This surface shall be free of impurities, undesirable films, foreign inclusions, slivers, cracks, scale and other defects. Electrodes shall be internally free of porosity, foreign inclusions, or anything else that would adversely affect the operation of the electrode. Oxide