INTERNATIONAL STANDARD

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Third edition
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Welding consumables — Technical delivery conditions for welding filler materials — Type of product, dimensions, tolerances and markings

Produits consommables pour le soudage — Conditions techniques de livraison des matériaux d'apport pour le soudage — Type de produit, dimensions, tolérances et marquage

Reference number
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Foreword

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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 544 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

This third edition cancels and replaces the second edition (ISO 544:1989), which has been technically revised.

Contents

Foreword

This document (EN ISO 544:2003) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DS in collaboration with Technical Committee ISO/TC 44 "Welding and allied processes".

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of an identical text or by endorsement, at the latest by April 2004, and conflicting national standards shall be withdrawn at the latest by April 2004.

This document supersedes EN 759:1997.

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

1 Scope

This European Standard specifies technical delivery conditions for filler materials for fusion welding. This European Standard does not apply to auxiliaries such as shielding gases.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 10204, *Metallic products – Types of inspection documents.*

EN ISO 4063, *Welding and allied processes – Nomenclature of processes and reference numbers (ISO 4063:1998).*

3 Type of product and relevant processes

Table 1 below indicates the range of products covered by this standard and processes in which they are used. Within brackets reference numbers from EN ISO 4063 are given.

Table 1 - Type of product and relevant processes

Type of product	Applied in welding process[a]
Cored strip electrode	EG, ES, S
Covered electrode	E
Solid rod	W, O, P
Solid strip electrode	ES, S
Solid wire	W, P, L, EB
Solid wire electrode	EG, ES, G, S
Tubular cored rod	W, O, P
Tubular cored wire	L, W
Tubular cored electrode	EG, ES, P, S, T
Thin foil	L, EB

[a] Correspondence between symbols used in this standard and reference numbers of EN ISO 4063, see below:

E Manual metal-arc welding (111)
EB Electron beam welding (51)
EG Electro gas welding (73)
ES Electro slag welding (72)
G Gas-shielded metal-arc welding (131, 135)
L Laser beam welding (52)
O Oxy-fuel gas welding (31)
P Plasma arc welding (15)
S Submerged arc welding (12)
T Tubular cored electrode arc welding with or without a shielding gas (136, 114)
W Tungsten inert-gas arc welding (141)

4 Dimensions and dimensional limits

4.1 Filler wires, covered electrodes and filler rods

Table 2 indicates standardized dimensions and tolerances for filler wires, covered electrodes and filler rods.

Table 2 - Dimensions and tolerances[a]

Dimensions in millimetres

Welding process	Solid wires and wire electrodes		Tubular cored wires and electrodes	Filler rods			Covered electrodes [b]			
	G, W, L, EB	S, ES, EG	T, S, EG	W, O, P			E			
Nominal diameter	Diameter tolerance	Diameter tolerance	Diameter Tolerance	Diameter tolerance	Length	Length tolerance	Diameter core wire	Diameter tolerance	Length	Length tolerance
0,5	+0,01 / –0,03	–	–	–	–	–	–	–	–	–
0,6		–	+0,02 / –0,05	±0,1	500 up to 1000	±5	–	–	–	
0,8	+0,01 / –0,04						–	–	–	
0,9							–	–	–	
1,0							–	–	–	
1,2		±0,04					–	–	–	
1,4							–	–	–	
1,6			+0,02 / –0,06				1,6	±0,06	200 up to 350	±5
1,8										
2,0							2,0			
2,4										
2,5							2,5			
2,8	+0,01 / –0,07						–	–	–	
3,0		±0,06					–	–	–	
3,2			+0,02 / –0,07				3,2	±0,10	275 up to 450 [c]	±5
4,0							4,0			
5,0	–		+0,02 / –0,08				5,0			
6,0							6,0			
8,0							8,0	±0,1		

– means not applicable.

[a] Other dimensions may be agreed. For intermediate dimensions tolerances given in the table shall be used.

[b] Dimensions for the core wire.

[c] For special cases (for example gravity welding) length up to 1000 mm.

4.2 Strip electrodes

Table 3 indicates dimensions and tolerances for strip electrodes.

Table 3 - Dimensions and tolerances for strip electrodes

Dimensions in millimetres

	Dimensions	Tolerances
Nominal thickness	≤ 1,0	± 0,05
Nominal width	≤ 100	+ 0,5 / 0
	> 100	+ 0,8 / 0

4.3 Cored strip electrodes and thin foils

For cored strip electrodes and thin foils dimensions and dimensional limits shall be as required by the application standard.

5 Condition of consumables

5.1 Covered electrodes

The covering of the electrodes shall be concentric and consistent along the length in order to avoid asymmetrical melting-off of the covering when welding. The electrode covering shall not exhibit any irregularities, cracks or other surface defects, which would adversely affect the welding operation. It shall firmly adhere to the core wire and shall not break off during proper handling and usage.

The grip end of the electrode shall be free from covering material for a length of at least 15 mm.

NOTE The striking end may be provided with arc ignition enhancing material.

5.2 Filler wires, filler rods and strip electrodes

The surface of the welding consumables shall be free from contamination and surface defects that can adversely affect welding. Any surface finish is allowed, provided that welding operation and properties of the weld metal are not adversely affected. All cored products shall have the core ingredients distributed throughout their length with uniformity such that the performance of the products, the chemical composition and the properties of the deposited weld metal thereby are not adversely affected.

Filler wires and strip electrodes are delivered in coils or wound on spools in accordance with Figure 1 and Table 4. They shall not exhibit kinks, waves, sharp bends or other irregularities that could interfere with continuous feeding. The beginning and end of the wire, spooled in one length, shall be secured.

Welding consumables on coils without formers shall be tied at three places, at least, approximately equally spaced around the circumference of the coil.

The solid wires and solid wire electrodes for steel shall not exhibit helix greater than described below. Helix is defined as the vertical separation between any part of one loop of wire placed on a flat surface without restraint and the flat surface. It shall not be more than 25 mm for spools having an outside

diameter of up to 200 mm (S 200) and not more than 50 mm for spools having a diameter of more than 200 mm (see Table 4).

The cast (diameter of some loops of wire placed on a flat surface without restraint), helix and condition of all the wires shall be such as to be suitable for uniform uninterrupted feeding on automatic or semi-automatic welding equipment.

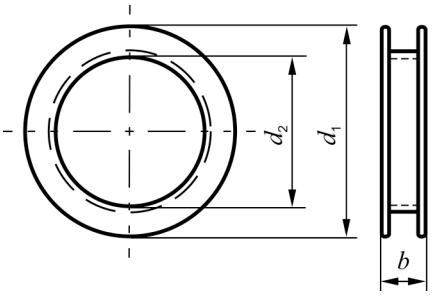

Figure 1a) - Rim (R)

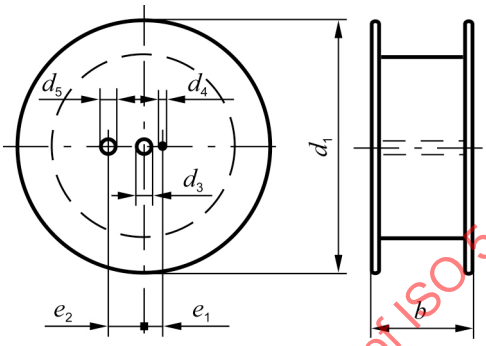

Figure 1b) - Reel/Spool (S)

NOTE: Reel/Spool (S) may have two pinholes

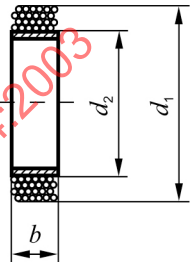

Figure 1c) - Coil (C)

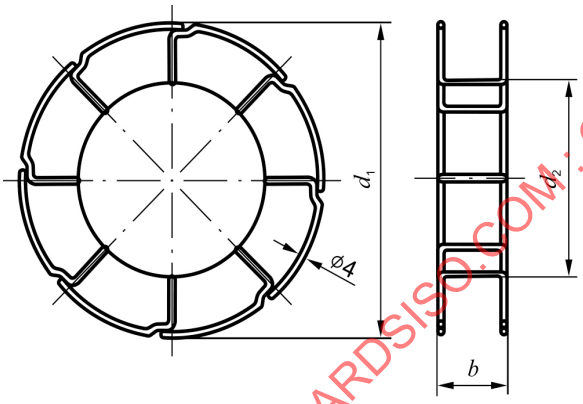

Figure 1d) - Basket rim (B)

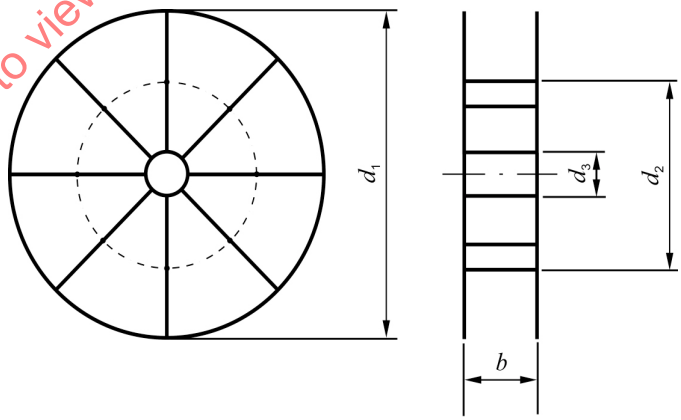

Figure 1e) - Basket spool (BS)

Figure 1 - Reels, rims, spools and coils

Table 4 - Dimensions and tolerances of reels, rims, spools and coils [a)]

Dimensions in millimetres

Type	Denomination	Outer diameter d_1	Inner diameter d_2	Outer width b	Bore diameter d_3	Pin Hole			
						Diameter		Distance from axis	
						d_4	d_5	e_1	e_2
Reel/Spool (S)	S 100	100 ± 2	–	45 + 0/ – 2	16,5 + 1/ – 0	-	-	-	-
Reel/Spool (S)	S 200	200 ± 3	–	55 + 0/ – 3	50,5 + 2,5/ – 0	10 + 1/ – 0	-	44,5 ± 0,5	-
Reel/Spool (S)	S 300	300 ± 5	–	103 + 0/ –3	50,5 + 2,5/ – 0	10 + 1/ – 0	-	44,5 ± 0,5	-
Reel/Spool (S)	S 350	350 ± 5	–	103 + 0/ –3	50,5 + 2,5/ – 0	10 + 1/ – 0	-	44,5 ± 0,5	-
Reel/Spool (S)	S 560	560 + 0 / –10	[b]	305 + 0/ –10	35,0 ± 1,5	18,7 ± 0,7	18,7 ± 0,7	63,5 ± 0,7	63,5 ± 0,7
Reel/Spool (S)	S 610	610 + 0 / –10	[b]	345 + 0/ –10	35,0 ± 1,5	16,7 ± 0,7	16,7 ± 0,7	63,5 ± 0,7	63,5 ± 0,7
Reel/Spool (S)	S 760E	760 + 0 / –10	–	290 +10/ –1	40,5 + 1/ – 0	25 + 1/ – 0	35 + 1/ – 0	65 ±1	110 ±1
Reel/Spool (S)	S 760A	760 + 0 / –10	[b]	345 + 0/ –10	35,0 ± 1,5	16,7 ± 0,7	16,7 ± 0,7	63,5 ± 0,7	63,5 ± 0,7
Rim (R)	R 435	435 ± 5	300 +15/ – 0	90 + 0/ –15	–		-	-	-
Basket rim (B)	B 300	300 + 0/ –5	180 ± 2	100 ± 3	–	-	-	-	-
Basket rim (B)	B 450	$_{max}$450	300 ± 5	100 ± 3	–	-	-	-	-
Basket spool (BS)	BS 300	300 ± 5	189 ± 0,5	103 + 0/ –3	50,5 + 2,5/ – 0	-	-	-	-
Coil (C)	C 435	$_{max}$435	300 +15/ – 0	90 + 0/ –15	–	-	-	-	-
Coil (C)	C 450	$_{max}$450	300 +15/ – 5	100 +10/ –5	–	-	-	-	-
Coil (C)	C 800	$_{max}$800	600 +20/ – 0	120 +10/ –5	–	-	-	-	-

[a] Other dimensions can be agreed.
[b] Outside diameter of barrel, d_2 shall be such as to permit feeding of the filler materials.