



SLOVENSKI STANDARD
SIST EN 60974-1:2000/A2:2003
01-oktober-2003

Arc welding equipment - Part 1: Welding power sources

Arc welding equipment -- Part 1: Welding power sources

Lichtbogenschweißeinrichtungen -- Teil 1: Schweißstromquellen

Matériel de soudage électrique -- Partie 1: Sources de courant pour soudage

Ta slovenski standard je istoveten z: EN 60974-1:1998/A2:2003

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ICS:

25.160.30 Varilna oprema Welding equipment

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EUROPEAN STANDARD

EN 60974-1/A2

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2003

ICS 25.160.30

English version

Arc welding equipment
Part 1: Welding power sources
(IEC 60974-1:1998/A2:2003)

Matériel de soudage électrique
Partie 1: Sources de courant
pour soudage
(CEI 60974-1:1998/A2:2003)

Lichtbogenschweißeinrichtungen
Teil 1: Schweißstromquellen
(IEC 60974-1:1998/A2:2003)

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This amendment A2 modifies the European Standard EN 60974-1:1998; it was approved by CENELEC on 2003-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 26/251/FDIS, future amendment 2 to IEC 60974-1:1998, prepared by IEC TC 26, Electric welding, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60974-1:1998 on 2003-06-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2004-03-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2006-06-01

Annexes designated "informative" are given for information only.
In this standard, annexes A and L are informative.

Endorsement notice

The text of amendment 2:2003 to the International Standard IEC 60974-1:1998 was approved by CENELEC as an amendment to the European Standard without any modification.

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**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC**

60974-1

1998

AMENDEMENT 2
AMENDMENT 2
2003-04

Amendement 2

Matériel de soudage électrique –

Partie 1:

Sources de courant pour soudage

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Amendment 2

[SIST EN 60974-1:2000/A2:2003](https://standards.iteh.ai/en/standards.iteh.ai/SIST-EN-60974-1-2000-A2-2003)

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Arc welding equipment –

Part 1:

Welding power sources

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International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE

V

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For price, see current catalogue*

FOREWORD

This amendment has been prepared by IEC technical committee 26: Electric welding.

The text of this amendment is based on the following documents:

FDIS	Report on voting
26/251/FDIS	26/258/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2004. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

Page 9

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CONTENTS

Annex A – Nominal voltages of supply systems

Replace the title of this Annex by the following:

Annex A – Nominal voltages of supply systems (see 6.1.1)

Add the title of Annex L as follows:

Annex L (informative) – Graphical symbols for arc welding equipment

Page 23

Replace definition 3.37 by the following definition:

3.37

duty cycle; duty factor (X)

the ratio for a given time interval of the uninterrupted on-load duration to the total time

NOTE 1 This ratio, lying between 0 and 1, may be expressed as a percentage.

NOTE 2 For the purposes of this standard, the total time period of one complete cycle is 10 min. For example, in the case of a 60 % duty cycle (duty factor), a load is applied continuously for 6 min followed by a no-load period of 4 min.

Page 39

Table 2 – Minimum creepage distances

Replace the existing Table 2 by the following new Table:

Table 2 – Minimum creepage distances

Voltage ¹⁾	Basic or supplementary insulation						Reinforced insulation											
	2			3			4			2			3			4		
	Material group			Material group			Material group			Material group			Material group			Material group		
V r.m.s.	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
	Creepage distance mm			Creepage distance mm			Creepage distance mm			Creepage distance mm			Creepage distance mm			Creepage distance mm		
10	0,4			1			1,6			0,48			1,2			1,6		
12,5	0,42			1,05			1,6			0,5			1,25			1,7		
16	0,45			1,1			1,6			0,53			1,3			1,8		
20	0,48			1,2			1,6			0,56	0,8	1,1	1,4	1,6	1,8	1,9	2,4	3
25	0,5			1,25			1,7			0,6	0,85	1,2	1,5	1,7	1,9	2	2,5	3,2
32	0,53			1,3			1,8			0,63	0,9	1,25	1,6	1,8	2	2,1	2,6	3,4
40	0,56	0,8	1,1	1,4	1,6	1,8	1,9	2,4	3	0,67	0,95	1,3	1,7	1,9	2,1	2,2	2,8	3,6
50	0,6	0,85	1,2	1,5	1,7	1,9	2	2,5	3,2	0,71	1	1,4	1,8	2	2,2	2,4	3	3,8
63	0,63	0,9	1,25	1,6	1,8	2	2,1	2,6	3,4	0,75	1,05	1,5	1,9	2,1	2,4	2,5	3,2	4
80	0,67	0,95	1,3	1,7	1,9	2,1	2,2	2,8	3,6	0,8	1,1	1,6	2	2,2	2,5	3,2	4	5
100	0,71	1	1,4	1,8	2	2,2	2,4	3	3,8	1	1,4	2	2,5	2,8	3,2	4	5	6,3
125	0,75	1,05	1,5	1,9	2,1	2,4	2,5	3,2	4	1,25	1,8	2,5	3,2	3,6	4	5	6,3	8
160	0,8	1,1	1,6	2	2,2	2,5	3,2	4	5	1,6	2,2	3,2	4	4,5	5	6,3	8	10
200	1	1,4	2	2,5	2,8	3,2	4	5	6,3	2	2,8	4	5	5,6	6,3	8	10	12,5
250	1,25	1,8	2,5	3,2	3,6	4	5	6,3	8	2,5	3,6	5	6,3	7,1	8	10	12,5	16
320	1,6	2,2	3,2	4	4,5	5	6,3	8	10	3,2	4,5	6,3	8	9	10	12,5	16	20
400	2	2,8	4	5	5,6	6,3	8	10	12,5	4	5,6	8	10	11	12,5	16	20	25
500	2,5	3,6	5	6,3	7,1	8	10	12,5	16	5	7,1	10	12,5	14	16	20	25	32
630	3,2	4,5	6,3	8	9	10	12,5	16	20	6,3	9	12,5	16	18	20	25	32	40
800	4	5,6	8	10	11	12,5	16	20	25	8	11	16	20	22	25	32	40	50
1 000	5	7,1	10	12,5	14	16	20	25	32	10	14	20	25	28	32	40	50	63

¹⁾ This voltage is the working voltage, when equipment is supplied at its rated voltage supply.

Page 41

6.1.4 Dielectric strength

Add, on page 43, after the second paragraph following Table 4 (just above the line "Alternative test:.."), the following note:

NOTE For the operator's safety, the lowest setting of overload setting (10 mA) is recommended.

Replace the text after the line "Alternative test:..." by the following:

Components shall not be disconnected or short-circuited unless the requirements of a), b) or c) below are met:

- a) The components are designed and tested to relevant standards that specify a voltage lower than the test voltage level of this standard. Example: fan motors and pump motors.

The components are completely incorporated within either the input circuit and exposed conductive parts or the output circuit and exposed conductive parts and their disconnection does not stop a portion of that circuit from being tested.

- b) Components completely incorporated within either the input or the output circuits may be short-circuited or disconnected during the dielectric strength test, provided that their disconnection does not stop a portion of that circuit from being tested. Example: electronic circuits.

- c) Interference suppression networks or protection capacitors between the input or welding circuit and any exposed conductive part may be disconnected during the test if they conform to their relevant standards.

Control circuits connected to the protective conductor terminal shall not be disconnected during testing and they are then tested as exposed conductive parts.

The test voltage may be raised to the full value slowly at the discretion of the manufacturer.

The test voltages between the input circuit, the exposed conductive parts and the welding circuit may be applied simultaneously. An example is given in Annex B.

Welding power sources incorporating a rectifier shall be tested after assembly of the complete welding power source, with the power rectifier remaining properly connected to the output circuit of the transformer or alternator. Rectifiers, their protective devices and other solid-state electronic components or capacitors, may be short-circuited during the test.

Mechanically powered welding power sources shall undergo the same test.

NOTE If this requirement is applied to the testing of properly cleaned, used welding power sources (for example after maintenance or repair without provision of new windings), their insulation should withstand 30 % of the values given in Table 4 or not less than 1 500 V a.c. r.m.s. between input and output circuit.

Conformity shall be checked by application of the test voltage for:

- a) 60 s (type test);
b) 5 s (routine test)

or

- c) 1 s (routine test with the test voltage increased by 20 %).

Page 45

6.2.1 Protection provided by the enclosure

Delete the third paragraph.

Page 51

Replace the existing Subclause 6.3.5 (in amendment 1) by the following new subclause:

6.3.5 Additional requirements for plasma cutting systems

Plasma tips, which for technical reasons cannot be protected against direct contact, shall be considered sufficiently protected from normal and single fault conditions if the following requirements are fulfilled:

a) when no arc current is present:

if the voltage between the plasma tip and the workpiece and/or earth is no higher than the peak value of 68 V or 48 V r.m.s.

and

b) for manual systems, when an arc is present:

the sides of the plasma tip cannot be touched by the test finger according to IEC 60529 when it is placed on a flat surface with its centre line perpendicular to it,

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the d.c. voltage between the plasma tip and the workpiece and/or earth is not higher than 113 V peak when the plasma tip is placed at the distance recommended by the manufacturer during cutting and gouging, from a flat surface with the centreline perpendicular to the surface,

or

c) when the voltage of a) or b) is exceeded:

the voltages are reduced as specified in Clause 13.

NOTE An example of a fault is an abnormal condition resulting from the electrode being in contact with the plasma tip because of missing insulators, sticking of the plasma tip to the electrode, conductive material between plasma tip and electrode, wrong parts, loose parts, electrode abrasion, parts inserted incorrectly, excessive duty cycle (duty factor), excessive current or incorrect gas flow.

Page 77

10.9 Supply coupling device (attachment plug)

Replace the first paragraph by the following:

If a supply coupling device is provided as a part of the arc welding equipment, its current rating shall not be less than a) and b) for all power systems.

For 125 V power systems, the current rating shall, additionally, not be less than either c) or d).

Page 87

11.5 Power supply to external devices

Replace, on page 89, item c) by the following:

- c) an isolating transformer in accordance with IEC 61558-2-4 with a secondary voltage rating up to 120 V r.m.s. if all exposed conductive parts of the external device, as recommended by the manufacturer, are connected to the protective earth conductor that is protected against the welding current, for example by a current sensing relay or by insulation of the relevant metal parts, for example by an enclosure.

Add the following new paragraph after item c):

External devices may include remote controls, arc striking and stabilizing devices (ASSD), torches or seam trackers or other devices containing a connection to the welding circuit.

11.6 Auxiliary power output

Replace the third paragraph by the following:

Near the output terminals or outlets of such power, the available current, the voltage, the duty cycle (duty factor) if less than 100 %, the frequency, the number of phases or d.c. and the status of the neutral (for example earthed or unearthed) as appropriate shall be clearly and indelibly marked.

Page 93

14.1 Enclosure

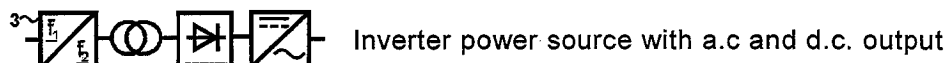
Replace the first sentence of item a) by the following:

- a) By an impact test using a pendulum impact hammer in accordance with annex I.1 or using a free fall weight in accordance with annex I.2 or equivalent means as follows:

Page 99

15.2 Contents

Add to box 4, on page 101, the following symbol and text:



Add to box 8 on page 103 the following symbol and text:



Direct or alternating current at the same output, and additionally the rated frequency in hertz

Replace the text of item a) of box 9 by the following:

- a) Peak value in case of direct current

Replace the text of box 10 by the following:

... A/... V to ... A/... V Range of output, minimum and maximum welding current and their corresponding load voltage.

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Replace the text of boxes 11a, 11b and 11c by the following:

11a, 11b, 11c ... % Values of the duty cycle (duty factor) at an ambient air temperature of 40 °C

Page 105

15.3 Tolerances

Replace the first sentence by the following:

Manufacturers shall meet rating plate values within the following tolerances by controlling component and manufacturing tolerances:

Page 111

17.2 Markings

Replace the existing Subclauses 17.2 and 17.3 by the following new Subclause 17.2:

17.2 Markings

Each welding power source shall be clearly and indelibly marked on or near the front panel or near the on/off switching device with the warning symbol combination,



Caution! Read operator's manual

indicating that arc welding and plasma cutting can be injurious to the operator and persons in the work area and that the instructions shall be consulted before operating.

The following equivalent wording may be used:

Warning: Read instruction manuals before operating and servicing this equipment.

For other additional markings, see Annex L.

Conformity shall be checked by visual inspection and by testing in accordance with the durability test in Clause 15.

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Page 113

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Annex A

Replace the title and text of Annex A by the following: