IEC 60974-3

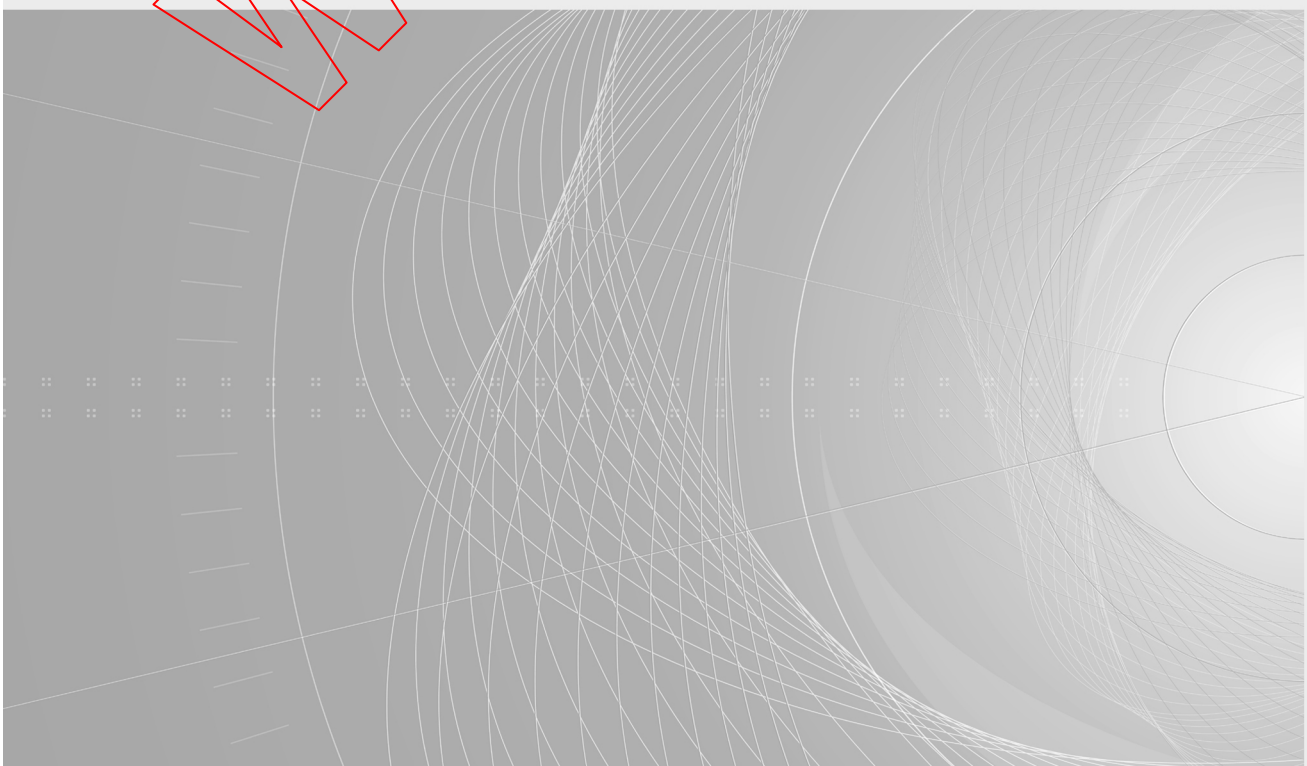
Edition 2.0 2007-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Arc welding equipment –
Part 3: Arc striking and stabilizing devices

Matériel de soudage à l'arc –
Partie 3: Dispositifs d'amorçage et de stabilisation de l'arc



IEC 60974-3:2007

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FOREWORD

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International Standard IEC 60974-3 has been prepared by IEC technical committee 26: Electric welding.

This second edition cancels and replaces the first edition published in 2003 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

– changes induced by the publication of IEC 60974-1, edition 3;
– routine test for built-in unit (see 5.5.2);
– clarification of calculation of the rated peak voltage (see 11.1 and Figure 1).

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

FDIS	Report on voting
26/363/FDIS	26/367/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part of IEC 60974 shall be read in conjunction with IEC 60974-1.

The list of all the parts of IEC 60974, under the general title *Arc welding equipment*, can be found on the IEC web site.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

ARC WELDING EQUIPMENT –

Part 3: Arc striking and stabilizing devices

1 Scope

This part of IEC 60974 specifies safety requirements for industrial and professional arc striking and arc stabilizing devices used in arc welding and allied processes.

This part of IEC 60974 is applicable to stand-alone arc striking and arc stabilizing devices that are either connected to a separate welding power source or built into the welding power source enclosure.

NOTE 1 Typical allied processes are for example plasma arc cutting and arc spraying.

NOTE 2 This standard does not include electromagnetic compatibility (EMC) requirements.

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.

IEC 60974-1:2005, *Arc welding equipment – Part 1: Welding power sources*

IEC 60974-7:2005, *Arc welding equipment – Part 7: Torches*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60974-1 and IEC 60974-7, as well as the following, apply.

3.1
arc striking device
device which superimposes a voltage on the welding circuit to ignite an arc

3.2
arc stabilizing device
device which superimposes a voltage on the welding circuit to maintain an arc

3.3
arc striking voltage
voltage superimposed on the no-load voltage to ignite an arc

3.4
arc stabilizing voltage
voltage superimposed on the arc voltage to maintain the arc

3.5
arc striking period
period during which the arc striking voltage is superimposed on the no-load voltage

4 Environmental conditions

As specified in IEC 60974-1, Clause 4.

5 Tests

5.1 Test conditions

As specified in 5.1 of IEC 60974-1.

5.2 Measuring instruments

The accuracy of measuring instruments shall be as follows.

a) Electrical measuring instruments: class 0,5 (±0,5 % of full-scale reading), except for the measurement of insulation resistance and dielectric strength where the accuracy of the instruments is not specified, but shall be taken into account for the measurement.

b) Thermometer: ±2 K.

c) High-voltage probe: ±5 %.

5.3 Conformity of components

As specified in 5.3 of IEC 60974-1.

5.4 Type tests

As specified in 5.4 of IEC 60974-1, with the addition of the following requirement.

Rated arc striking and stabilizing peak voltage shall be measured in accordance with 11.1 in any convenient sequence of type tests but before verifying mechanical provisions.

The other type tests included in this standard may be carried out in any convenient sequence.

5.5 Routine tests

5.5.1 Stand-alone unit

All routine tests shall be carried out on each stand-alone unit in the following sequence:

a) general visual inspection (see 3.7 of IEC 60974-1);

b) continuity of the protective circuit (see Clause 10 and, if applicable, 10.4.2 of IEC 60974-1);

c) dielectric strength (see 6.1.5 of IEC 60974-1);

d) high-voltage circuit test: working voltage shall be applied to high-voltage circuits to establish insulation integrity as specified by the manufacturer;

NOTE No-load voltage and connection of the return cable, either to the ground circuit or isolated, affects working voltage.

e) general visual inspection (see 3.7 of IEC 60974-1).

5.5.2 Built-in unit

The following routine test shall be carried out on each built-in unit in any convenient sequence for the power source.

a) High-voltage circuit test: working voltage shall be applied to high-voltage circuits to establish insulation integrity as specified by the manufacturer.

NOTE No-load voltage and connection of the return cable, either to the ground circuit or isolated, affects working voltage.

6 Protection against electric shock

6.1 Insulation

6.1.1 General

As specified in 6.1.1 of IEC 60974-1.

6.1.2 Clearances

As specified in 6.1.2 of IEC 60974-1, with the addition of the following requirement.

The minimum clearances of high-voltage components shall be in accordance with Table 1.

Conformity shall be checked by measurement and visual inspection.

6.1.3 Creepage distances

As specified in 6.1.3 of IEC 60974-1, with the addition of the following requirement.

The minimum creepage distances of arc striking and stabilizing circuits shall be in accordance with Table 1.

Conformity shall be checked by measurement and visual inspection.

Table 1 – Minimum clearances and creepage distances for arc striking and stabilizing circuits

Rated peak voltage[a] kV	Clearance [b] mm	Creepage distance[b] mm
3	3	6,3
6	5,5	10
8	8	12,5
10	11	16
12	14	20
15	18	25
18	25	30
20	30	35

NOTE These values apply to circuits which are designed in accordance with 11.3.

[a] Rated peak voltage shall be measured in accordance with 11.1.

[b] Interpolation is allowed.

6.1.4 Insulation resistance

As specified in 6.1.4 of IEC 60974-1.

6.1.5 Dielectric strength

The output circuit of arc striking and stabilizing devices and the insulation of coupling components (for example, coupling transformers or coupling capacitors) shall withstand an

arc striking test voltage 20 % higher than the rated peak arc striking voltage at the maximum pulse repetition rate of the device. Alternatively, an a.c. test voltage with the same peak value of approximately sine waveform at 50 Hz or 60 Hz may be used for coupling components only.

Conformity shall be checked by the following test.

Coupling components intended for use with arc striking and stabilizing voltages shall be subjected to the arc striking test voltage or the a.c. test voltage for 60 s.

NOTE Interference suppression capacitors are not coupling devices.

The output circuit shall be subjected to the arc striking test voltage for 60 s applied between the point of connection to the welding electrode and

a) exposed conductive parts;

b) other isolated circuits.

Flashover or breakdown shall not occur. Any discharges unaccompanied by a voltage drop (corona) are disregarded.

NOTE Interference suppression capacitors are subjected to the test of the output circuit.

6.2 Protection against electric shock in normal service (direct contact)

As specified in 6.2 of IEC 60974-1.

6.3 Protection against electric shock in case of a fault condition (indirect contact)

As specified in 6.3 of IEC 60974-1, with the addition of the following requirement.

The output circuit shall be electrically isolated from the public supply system by double or reinforced insulation in accordance with the maximum rated input voltage. Figure A.1 shows examples of coupling systems for arc striking and stabilizing devices.

Conformity shall be checked by visual inspection.

7 Thermal requirements

Current-carrying components, incorporated in the arc striking and stabilizing device, shall be capable of carrying the rated welding current as specified by the manufacturer without

a) exceeding the temperature rating of the current-carrying components;

b) causing the surface temperatures, specified in Table 7 of IEC 60974-1, to be exceeded.

For liquid-cooled apparatus, the test shall be carried out with the minimum flow and the maximum temperature of the coolant, as recommended by the manufacturer.

Conformity shall be checked by measurement in accordance with 7.2 of IEC 60974-1.

8 Abnormal operation

As specified in Clause 8 of IEC 60974-1, with the addition of the following requirement.

In the case of a stand-alone arc striking and stabilizing device the abnormal operation tests shall be carried out as applicable.

If the arc striking and stabilizing device is designed for use with a specific welding power source, the abnormal operation tests shall be conducted with the arc striking and stabilizing device connected to that welding power source.

The arc stabilizing device shall be short circuited at the output, with neither a torch nor a return cable connected, until equilibrium is achieved.

Arc striking and stabilizing devices protected internally, for example by automatic shut-off, meet this requirement if the protection device operates before an unsafe condition occurs.

9 Thermal protection

As specified in Clause 9 of IEC 60974-1, where applicable.

10 Connection to the input supply network

As specified in Clause 10 of IEC 60974-1, with the addition of the following requirement.

Earthing of exposed conductive parts is not required if the arc striking and stabilizing device is rated for input voltages not greater than safety extra low voltage (SELV) or if the input voltage is supplied by the welding circuit.

11 Output

11.1 Rated peak voltage

The rated peak voltage for arc striking and stabilizing devices shall not exceed the maximum values given in Table 2.

The arc striking and stabilizing voltage is obtained by subtraction of the no-load voltage given in Table 13 of IEC 60974-1 (see Figure 1).

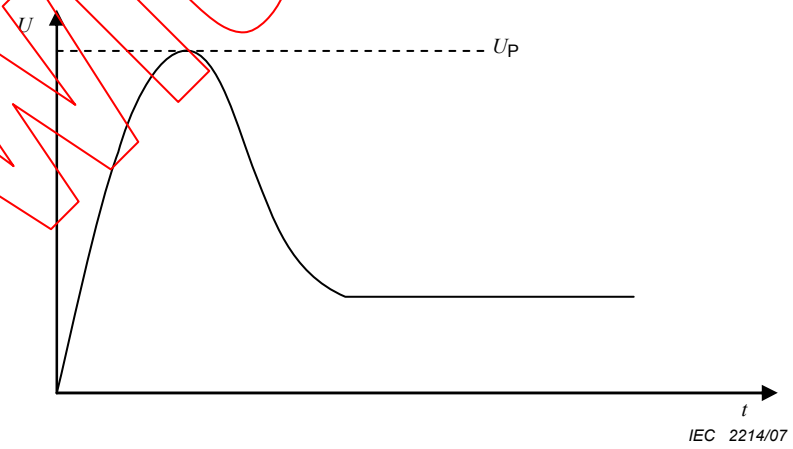

Figure 1 – Rated peak voltage