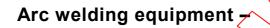
INTERNATIONAL STANDARD



First edition 2003-01



Part 6: Limited duty manual metal arc welding power sources

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This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.



Reference number IEC 60974-6:2003(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

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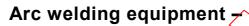
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Commission Electrotechnique Internationale International Electrotechnical Commission Международная Электротехническая Комиссия PRICE CODE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ARC WELDING EQUIPMENT –

Part 6: Limited duty manual metal arc welding power sources

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one on its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEQ shall not be here responsible for identifying any or all such patent rights.

International Standard IEC 60974-6 has been prepared by IEC technical committee 26: Electric welding.

This part of IEC 60974 is to be used in conjunction with IEC 60974-1.

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

$\mathcal{A} \boxtimes \mathcal{D}$	FDIS	Report on voting
$\overline{\}$	26/247/FDIS	26/250/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.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

ARC WELDING EQUIPMENT –

Part 6: Limited duty manual metal arc welding power sources

1 Scope

This part of IEC 60974 is applicable to power sources with a thermal cut-out device for manual metal arc welding with limited duty.

These welding power sources are mainly used by laymen.

This part of IEC 60974 specifies safety requirements for construction and performance requirements of welding power sources, limited to a rated maximum welding current of 160 A.

This part of IEC 60974 is not applicable to:

- rotating welding power sources;
- welding power sources with remote control;
- welding power sources incorporating frequency ponversion

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 60050-151:2001, International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices

IEC 60050-851:1991, International Electrotechnical Vocabulary (IEV) – Chapter 851: Electric welding

IEC 60204-1:1997, Safety of machinery - Electrical equipment of machines - Part 1: General requirements

IEC 60245-6, Rubber insulated cables – rated voltages up to and including 450/750 V – Part 6: Arc welding electrode cables

IEC 60664-1:1992, Insulation coordination for equipment within low-voltage systems – Part 1: *Principles, requirements and tests*

IEC 60974-1:1998, Arc welding equipment – Part 1: Welding power sources

IEC 61032:1997, Protection of persons and equipment by enclosures – Probes for verification

ISO 857-1, Welding and allied processes – Vocabulary – Part: 1 Metal welding processes

ISO 2560, Covered electrodes for manual arc welding of mild steel and low alloy steel – Code of symbols for identification

3 Terms and definitions

For the purpose of this part of IEC 60974, the terms and definitions contained in IEC 60050-151, IEC 60050-851, IEC 60204-1, IEC 60664-1 and in IEC 60974-1, as well as the following apply:

3.1

manual metal arc welding

manually operated metal-arc welding using a covered electrode

[ISO 857-1, 4.2.4.4]

3.2

limited duty welding power source

power source whose operating condition is defined by the sets and resets (OFF and ON operation) of its thermal cut-out device

3.3

reference electrode

electrode of the type E 43 R with a diameter and rated welding current in accordance with ISO 2560

3.4

lavman

operator who does not weld in the performance of his profession and may have little or no formal instruction in arc welding

https:/3.5 ndards.iteh.a thermal cut-out device

temperature sensitive device which limits the temperature of the components of the welding power source by automatically opening the circuits or by reducing the currents, and being reset automatically

3.6

load time, tw

time between the reset (ON operation) and the set (OFF operation) of the thermal cut-out device

3.7

reset time, t_r

time between the set (OFF operation) and the reset (ON operation) of the thermal cut-out device

3.8

cycle time

time between two consecutive resets (ON operation) or sets (OFF operation) of the thermal cut-out device

3.9

maximum effective supply current (I_{1eff})

maximum value of effective input current calculated by the formula :

$$I_{leff} = \sqrt{I_1^2 \times \frac{t_w}{t_w + t_r} + I_0^2 \times \frac{t_r}{t_w + t_r}}$$

where

 $t_{\rm w}$ is the load time;

- t_r is the reset time;
- I_1 is the rated supply current;
- I_0 is the rated no-load supply current.

4 Environmental conditions

As specified in IEC 60974-1, Clause 4.

5 Test conditions

As specified in IEC 60974-1, Clause 5 with the following modification:

The ambient air temperature during the heating test shall not be less than 20 °C.

5.1 Type tests

As specified in IEC 60974-1, 5.1 with the tollowing modification:

Replace the type test 'd) thermal protection' as specified in IEC 60974-1, 5.1 by the type test https: "thermal cut-out device" as specified in Clause 9 of this part of IEC 60974.

5.2 Routine tests

As specified in IEC 60974-1, 5.2 with the following modifications:

The test for rated minimum welding current does not apply.

Routine tests may be carried out in short circuit condition, according to the manufacturer's test procedure.

6 Protection against electric shock

6.1 Insulation

As specified in IEC 60974-1, 6.1.

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

6.2.1 Protection provided by the enclosure

As specified in IEC 60974-1, 6.2.1.

Additionally, the enclosure shall be such that

- a) a 50 mm long test pin (see IEC 61032 test finger 12) cannot be inserted from all sides except the underside and
- b) a 15 mm long test pin (see IEC 61032 test finger 13) cannot be inserted from the underside;

to touch:

- a) live parts of the input circuit or
- b) in the case of Class II welding power sources, any metal part which is separated from live parts only by basic insulation.

Conformity shall be checked in accordance with IEC 61032.

6.2.2 Capacitors

As specified in IEC 60974-1, 6.2.2.

6.2.3 Automatic discharge of input capacitors

As specified in IEC 60974-1, 6.2.3.

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

6.3.1 Insulation of the input circuit and the welding circuit

As specified in IEC 60974-1, 6.3.1.

6.3.2 Insulation between windings of the input circuit and the welding circuit

As specified in IEC 60974-1, 6.3.2.

https://6.3.3 arc Internal conductors and connections 7-07d7-467e-b16b-1cd409411647/iec-60974-6-2003

As specified in IEC 60974-1, 6.3.3.

6.3.4 Movable coils and cores

If movable colls or cores are used to adjust the welding current, the construction shall be such that the prescribed clearances and creepage distances are maintained, taking into account electrical and mechanical stresses.

6.3.5 Primary leakage current

The primary leakage current from exposed conductive surfaces to the supply coupling device or to the external protective conductor terminal shall not exceed 5 mA under the following conditions:

- the welding power source is:
 - isolated from the ground plane;
 - supplied by the highest rated supply voltage;
 - not connected to the protective earth;
- the output circuit is in the no-load condition;
- primary capacitors are not disconnected;
- interference suppression capacitors are either connected or disconnected.