

# INTERNATIONAL STANDARD

# IEC 60974-6

First edition  
2003-01

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## Arc welding equipment –

### Part 6: Limited duty manual metal arc welding power sources

iTek Standards

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ARC WELDING EQUIPMENT –

## Part 6: Limited duty manual metal arc welding power sources

## FOREWORD

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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:

FDIS	Report on voting
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- withdrawn;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 conversion.

#### 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

##### **layman**

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

#### 3.5

##### **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, $t_w$**

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 :

$$I_{1eff} = \sqrt{I_1^2 \times \frac{t_w}{t_w + t_r} + I_0^2 \times \frac{t_r}{t_w + t_r}}$$

where

$t_w$  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 following modification:

Replace the type test 'd) thermal protection' as specified in IEC 60974-1, 5.1 by the type test "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.

### **6.3.3 Internal conductors and connections**

As specified in IEC 60974-1, 6.3.3.

### **6.3.4 Movable coils and cores**

If movable coils 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.