INTERNATIONAL STANDARD

IEC 60974-7

Second edition
2005-07

Arc welding equipment –

Part 7: Torches

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ARC WELDING EQUIPMENT –

Part 7: Torches

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60974-7 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.

This second edition cancels and replaces the first edition published in 2000 and constitutes a technical revision. The main changes with respect to the previous edition are listed below:

- the scope includes relationship to IEC 60974-1 and a note is added (see Clause 1);
- normative references are updated (see Clause 2);
- a preliminary insulation resistance test is added (see item b) of 6.2);
- TIG and plasma torches now have an arc striking and stabilizing voltage rating (see 7.1, 7.3 and item c) of Clause 13);

- a procedure to determine the arc striking and stabilizing voltage rating of plasma torches is given (see 7.3);
- requirements for plasma cutting torches are updated to harmonize with IEC 60974-1:2005 (see 7.4.2);
- “Heating test for liquid cooled torches” and “Instructions for use” incorporate elements of IEC 60974-2 (see 8.3 and item e) of Clause 13);
- during the heating test, the gas flow tolerance has been modified (see Tables 2, 3, 4 and 6);
- the temperature of the hot wire is maintained during the “Resistance to hot objects” test (see Clause 10);
- accessible parts shall not have sharp edges, rough surfaces or protruding parts likely to cause injury (see 11.2);
- “Instructions for use” shall contain environmental conditions (see item h) of Clause 13).

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

FDIS	Report on voting
26/308/FDIS	26/312/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.

IEC 60974 consists of the following parts, under the general title *Arc welding equipment*:

Part 1: Welding power sources
Part 2: Liquid cooling systems
Part 3: Arc striking and stabilizing devices
Part 4: Safety, maintenance and inspection of arc welding equipment in use [1]
Part 5: Wire feeders
Part 6: Limited duty manual metal arc welding power sources
Part 7: Torches
Part 8: Gas consoles for welding and plasma cutting systems
Part 10: Electromagnetic compatibility (EMC) requirements
Part 11: Electrode holders
Part 12: Coupling devices for welding cables
Part 13: Terms [1]

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.

[1] Under consideration.

ARC WELDING EQUIPMENT –

Part 7: Torches

1 Scope

This part of IEC 60974 specifies safety and construction requirements for torches for arc welding and allied processes.

In this part of IEC 60974, a torch consists of the torch body, the cable-hose assembly and other components.

This part of IEC 60974 is not applicable to electrode holders for manual metal arc welding or torches for air-arc cutting/gouging.

NOTE In this part of IEC 60974, the terms "torch" and "gun" are interchangeable. For convenience "torch" has been used in the following text.

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), *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices*

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

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

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

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

IEC 60974-2, *Arc welding equipment – Part 2: Liquid cooling systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050(151), IEC 60050(851), IEC 60664-1, and IEC 60974-1, as well as the following, apply.

NOTE Additional terminology is given in Annex A.

3.1
torch
device that conveys all services necessary to the arc for welding, cutting or allied processes (for example, current, gas, coolant, wire electrode)

3.2
gun
torch with a handle substantially perpendicular to the torch body

3.3
torch body
main component to which the cable-hose assembly and other components are connected

3.4
handle
part designed to be held in the operator's hand

3.5
gas nozzle
component at the exit end of the torch directing the shielding gas around the arc and over the weld pool

3.6
non-consumable electrode
arc welding electrode which does not provide filler metal

3.7
wire electrode
solid or tubular filler wire which conducts welding current

3.8
contact tip
replaceable metal component fixed at the front end of the torch, which transfers the welding current to, and guides, the wire electrode

3.9
cable-hose assembly
flexible assembly of cables and hoses, and their connecting elements, that delivers all necessary supplies to the torch body

3.10
manual torch
torch held and guided by the operator's hand during its operation

3.11
mechanically guided torch
torch fixed to, and guided by, a mechanical device during its operation

3.12
air-cooled torch
torch cooled by the ambient air and, where appropriate, by the shielding gas

3.13
liquid-cooled torch
torch cooled by the circulation of a cooling liquid

3.14
motorized torch
torch incorporating means to supply motion to the wire electrode

3.15
spool-on torch
motorized torch incorporating a filler wire supply

3.16
arc striking and stabilizing voltage
voltage superimposed on the welding circuit to initiate or maintain the arc or both

3.17
filler metal
metal added during welding or allied processes
[IEV 851-04-24]

3.18
filler wire
filler metal in solid or tubular wire form which may or may not be part of the welding circuit

3.19
plasma tip
component that provides the constricting orifice through which the plasma arc passes

3.20
visual inspection
inspection by eye to verify that there are no apparent discrepancies with respect to the provisions of the standard concerned
[IEC 60974-1, 3.7]

3.21
plasma cutting system
combination of power source, torch, and associated safety devices for plasma cutting/gouging

3.22
plasma cutting power source
equipment for supplying current and voltage and having the required characteristics suitable for plasma cutting/gouging and which may supply gas and cooling liquid

NOTE A plasma cutting power source may also supply services to other equipment and auxiliaries, for example auxiliary power, cooling liquid, and gas.

[IEC 60974-1, 3.55]

4 Environmental conditions

Torches shall be capable of operation when the following environmental conditions prevail:

a) Ambient air temperature:
   – during operation: –10 °C to +40 °C;
   – after transport and storage: –25 °C to +55 °C;
b) Relative humidity of the air: up to 90 % at 20 °C.

NOTE Different environmental conditions may be agreed upon between the manufacturer and the purchaser. Examples of these conditions are: high humidity, unusually corrosive fumes, steam, excessive oil vapour, abnormal vibration or shock, excessive dust, severe weather conditions, unusual coastal or shipboard conditions, vermin infestation and atmospheres conducive to the growth of mold.

5 Classification

5.1 General

Torches shall be classified in accordance with

a) the process for which they are designed, see 5.2;
b) the method by which they are guided, see 5.3;
c) the type of cooling, see 5.4;
d) the method of striking the main arc for plasma processes, see 5.5.

5.2 Process

Torches can be designed for

a) MIG/MAG welding;
b) self-shielded flux-cored arc welding;
c) TIG welding;
d) plasma welding;
e) submerged arc welding;
f) plasma cutting/gouging.

5.3 Guidance

Methods of torch guidance:

a) manual;
b) mechanical.

5.4 Cooling

Type of torch cooling method:

a) ambient air or shielding gas, see 3.12;
b) liquid, see 3.13.

5.5 Main arc striking for plasma processes

Methods for striking the main arc:

a) by an arc striking voltage;
b) by a pilot arc;
c) by contact.