IEC 60974-5

Edition 3.0 2013-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Withdrawn

Arc welding equipment – Part 5: Wire feeders

Matériel de soudage à l'arc – Partie 5: Dévidoirs

IEC 60974-5:2013

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ARC WELDING EQUIPMENT –

Part 5: Wire feeders

FOREWORD

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International Standard IEC 60974-5 has been prepared by IEC technical committee 26: Electric welding.

This third edition cancels and replaces the second edition published in 2007 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 60974-1:2012;
– addition of a new symbol for hot surface (as specified in Clause 9);
– determination of the maximum load in accordance with 10.7.

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

FDIS	Report on voting
26/503/FDIS	26/507/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 standard shall be used 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 stability 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,
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ARC WELDING EQUIPMENT –

Part 5: Wire feeders

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1 Scope

This part of IEC 60974 specifies safety and performance requirements for industrial and professional equipment used in arc welding and allied processes to feed filler wire.

The wire feeder may be a stand-alone unit which may be connected to a separate welding power source or one where the welding power source and the wire feeder are housed in a single enclosure.

The wire feeder may be suitable for manually or mechanically guided torches.

This part of IEC 60974 is not applicable to spool-on torches that are covered by IEC 60974-7.

This part of IEC 60974 is not applicable to wire feeders which are designed mainly for use by laymen and design in accordance with IEC 60974-6.

NOTE 1 Typical allied processes are electric arc cutting and arc spraying.

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-195, *International Electrotechnical Vocabulary (IEV) – Part 195: Earthing and protection against electric shock*

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

IEC 60974-1:2012, *Arc welding equipment – Part 1: Welding power sources*

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

IEC 60974-10, *Arc welding equipment – Part 10: Electromagnetic compatibility (EMC) requirements*

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-195, IEC 60974-1, and IEC 60974-7, as well as the following apply.

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3.1
drive roll
roll in contact with the filler wire and which transfers mechanical power to the filler wire

3.2
filler wire supply
source of filler wire and means for dispensing filler wire to the feeding mechanism

3.3
liner
replaceable component that guides the filler wire

3.4
maximum load
maximum value of the force required to feed the specified types and sizes of filler wires over the rated speed range

3.5
rated speed range
speed range of the filler wire assigned by the manufacturer for each specified size of filler wire

3.6
rated supply current
I_1
r.m.s. value of an input current to the wire feeder at maximum load

3.7
wire-feed control
electrical or mechanical apparatus, or both, which control(s) the speed of the filler wire, the sequence of operations and other services as required

Note 1 to entry: The wire feed control may be integral with the wire feeder or in a separate enclosure.

3.8
wire feeder
equipment that delivers filler wire to the arc or weld zone which includes means to apply motion to the filler wire

Note 1 to entry: The wire feeder may also include the wire-feed control, the filler wire supply, devices for gas control, indicators and remote connectors.

4 Environmental conditions

As specified in Clause 4 of IEC 60974-1:2012.

5 Tests

5.1 Test conditions

As specified in 5.1 of IEC 60974-1:2012.

5.2 Measuring instruments

The accuracy of measuring instruments shall be:

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a) electrical measuring instruments: class 1 (±1 % 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) tachometer: ± 1 % of full-scale reading;

d) pressure measuring instruments: class 2,5 (±2,5 % of full-scale reading).

5.3 Conformity of components

As specified in 5.3 of IEC 60974-1:2012.

5.4 Type tests

All type tests given below shall be carried out on the same wire feeder.

As a condition of conformity the type tests given below shall be carried out in the following sequence:

a) visual inspection (as defined in 3.7 of IEC 60974-1:2012);

b) insulation resistance (as specified in 6.1.4 of IEC 60974-1:2012 (preliminary check));

c) enclosure (as specified in 14.2 of IEC 60974-1:2012);

d) handling means (as specified in 10.3);

e) drop withstand (as specified in 10.4);

f) protection provided by the enclosure (as specified in 6.2.1);

g) insulation resistance (as specified in 6.1.4 of IEC 60974-1:2012);

h) dielectric strength (as specified in 6.1.5 of IEC 60974-1:2012);

i) visual inspection (as defined in 3.7 of IEC 60974-1:2012).

The other tests included in this standard and not listed here shall be carried out, but may be completed in any convenient sequence.

5.5 Routine tests

All routine tests given below shall be carried out on each wire feeder in the following sequence:

a) visual inspection in accordance with manufacturer's specification;

b) continuity of the protective circuit, if applicable (as specified in 10.5.3 of IEC 60974-1:2012);

c) dielectric strength (as specified in 6.1.5 of IEC 60974-1:2012);

6 Protection against electric shock

6.1 Insulation

As specified in 6.1 of IEC 60974-1:2012.

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

6.2.1 Protection provided by the enclosure

Wire feeders shall have a minimum degree of protection in accordance with Table 1 using IEC 60529 test procedures and conditions.

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Table 1 – Minimum degree of protection

Component	Designed for indoor use	Designed for outdoor use
Motor and control supplied by a voltage ≤ SELV	IP2X	IP23S
Motor and control supplied by a voltage > SELV	IP21S	IP23S
Live parts at welding potential for wire feeders used with manually guided torches (for example, filler wire, wire spool, drive rolls)	IPXX	IPX3
Live parts at welding potential for wire feeders used with mechanically guided torches (for example, filler wire, wire spool, drive rolls)	IPXX	IPXX
NOTE Additional requirement for mechanical hazards are given in 10.8.		

Wire feeders with degree of protection IP23S may be stored but are not intended to be used outside during precipitation unless sheltered.

Adequate drainage shall be provided by the enclosure. Retained water shall not interfere with the correct operation of the equipment or impair safety. The quantity of water that may enter the enclosure during the following test is not limited.

Conformity shall be checked by the following test:

The filler wire shall be fed into the drive system and all external connectors shall be connected or covered.

The wire feeder shall be subjected to the appropriate water test without being energized. Immediately after the test, the wire feeder shall be moved to a safe environment and subjected to the insulation resistance test, listed in 5.4 g) and dielectric strength test, listed in 5.4 h).

When live parts at welding potential are protected against precipitation, the filler wire shall show no visual wetness after the test.

6.2.2 Capacitors

As specified in 6.2.2 of IEC 60974-1:2012.

6.2.3 Automatic discharge of supply circuit capacitors

As specified in 6.2.3 of IEC 60974-1:2012.

6.2.4 Isolation of the welding circuit

As specified in 6.2.4 of IEC 60974-1:2012.

6.2.5 Welding circuit touch current

For Class I stand-alone wire feeders, as specified in 6.2.5 of IEC 60974-1:2012.

6.2.6 Touch current in normal condition

As specified in 6.2.6 of IEC 60974-1:2012.

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

6.3.1 Protective provisions

Wire feeder shall be class I, class II or class III equipment in accordance with IEC 61140, with the exception of the welding circuit.

6.3.2 Isolation between windings of the supply circuit and the welding circuit

As specified in 6.3.2 of IEC 60974-1:2012.

6.3.3 Internal conductors and connections

As specified in 6.3.3 of IEC 60974-1:2012.

6.3.4 Isolation of the welding circuit from the frame

Live parts at welding potential (for example, filler wire, wire spool, drive rolls) shall be isolated from the wire feeder frame or other structure to which they are attached by basic insulation (minimum clearances are specified in Tables 1 of IEC 60974-1:2012 and minimum creepage distances are specified in Table 2 of IEC 60974-1:2012).

Conformity shall be checked as specified in 6.1.2 and 6.1.3 of IEC 60974-1:2012.

6.3.5 Touch current in fault condition

For Class I stand-alone wire feeders, as specified in 6.3.6 of IEC 60974-1:2012.

6.4 Supply voltage

The supply voltage shall be supplied from a welding power source as specified in 11.5 of IEC 60974-1:2012 or from the supply network provided that 6.5 is met.

6.5 Protective provisions

Connection of exposed conductive parts to the protective conductor is not required if the supply voltage is supplied by the welding circuit or safety extra low voltage (SELV).

Connection of exposed conductive parts to the protective conductor is required if the wire feeder is rated for supply voltages above SELV. The protective conductor connection shall be secured to the frame or enclosure by a screw or fastening that shall not require removal during any servicing operation. Solder alone shall not be used for securing the protective conductor terminals.

The welding circuit and conductive parts connected to the welding circuit shall not be connected to the protective conductor.

Where a protective conductor is used, it shall be protected against damage by stray welding currents, for example, by a device to sense welding current in the protective earth conductor under a fault condition and to de-energize the welding circuit or by insulation of the relevant metal parts, for example, by an enclosure.

Conformity shall be checked by visual inspection and performing the following fault simulations:

a) applying a current not greater than the rated current value of the protective conductor;

b) passing the maximum rated welding current through the protective conductor without damage.

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6.6 Overcurrent protection of the supply circuit

Internal wiring shall be protected by an overcurrent protective device such as a fuse or circuit-breaker.

If a wire feeder is designed for use with a specific welding power source, the overcurrent protective device may be within the welding power source.

Conformity shall be checked by visual inspection.

6.7 Cable anchorage

The supply cable anchorage of wire feeders which are supplied by a voltage in excess of safety extra low voltage (SELV) shall meet 10.6 of IEC 60974-1:2012, except for those powered from the welding circuit.

6.8 Auxiliary power supply

As specified in 11.6 of IEC 60974-1:2012.

6.9 Inlet openings

As specified in 10.7 of IEC 60974-1:2012.

6.10 Control circuits

As specified in Clause 12 of IEC 60974-1:2012.

6.11 Isolation of hanging means

If an attachment is provided for hanging the wire feeder during welding, the attachment shall be electrically insulated from the wire feeder enclosure.

A warning in the instructions shall be given that, if an alternative method of support is used, insulation shall be provided between the wire feeder enclosure and the support.

Conformity shall be checked by visual inspection.

7 Liquid cooling system

Component parts of wire feeders, through which cooling liquid flows, shall be capable of operating at an inlet pressure up to 0,5 MPa (5 bar) and with a coolant temperature up to 70 °C without leaking.

Conformity shall be checked by visual inspection while applying 0,75 MPa (7,5 bar) for 120 s at test conditions specified in 5.1.

8 Shielding gas supply

Component parts of wire feeders, through which shielding gas flows and which are under pressure when the gas valve is closed, shall be capable of operating at an inlet pressure up to 0,5 MPa (5 bar) without leaking. In the case where multiple valves are used, they shall be tested independently.

Conformity shall be checked by visual inspection (e.g. liquid soap bubble test or pressure drop test) while blocking the gas valve and applying an inlet pressure of 0,75 MPa (7,5 bar) for 30 s.

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9 Thermal requirements

Wire feeders designed for use with manual torches shall be capable of operating under maximum load determined in accordance with 10.7 at 60 % duty cycle (6 min “on” and 4 min “off”) without causing any component to exceed its rated temperature.

Where a wire feeder and a power source are housed in a single enclosure, the wire feeder shall be capable of operating under maximum load determined in accordance with 10.7 at the duty cycle corresponding to the rated maximum welding current of the power source.

Wire feeders designed for use with mechanically guided torches shall be capable of operating under maximum load determined in accordance with 10.7 at 100 % duty cycle without causing any component to exceed its rated temperature.

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.

Additionally, the wire feeder shall meet the requirements specified above, when it is cycled for 4 s “on” and 2 s “off” during the 6 min “on” time of the duty cycle specified above.

Current-carrying components shall be capable of carrying the rated welding current without causing the external surface temperatures of the wire feeder, specified in Table 7 of IEC 60974-1:2012, to be exceeded. External surface temperatures in restricted access areas, e.g. robotic applications, or covered areas in normal use, e.g. welding circuit, may exceed the limits of Table 7 of IEC 60974-1:2012 up to a rise of 60 K over ambient temperature, if marked with the following symbol IEC 60417-5041:

Conformity shall be checked by measurement in accordance with 7.2 of IEC 60974-1:2012 with the wire feeder loaded to the maximum load determined in accordance with 10.7.

10 Mechanical provisions

10.1 Wire feeder

A wire feeder shall be constructed and assembled so that it has the strength and rigidity necessary to withstand normal service. Protection shall be provided against hazardous moving parts (such as pulleys, belts, fans, gears, etc.).

Accessible parts shall have no sharp edges, rough surfaces or protruding parts likely to cause injury.

After the tests in accordance with 10.2 to 10.4, the wire feeder shall comply with the provisions of this standard. Some deformation of the structural parts or enclosure is permitted provided this does not reduce the level of safety protection.

Conformity shall be checked by visual inspection after meeting the requirements of 10.2 to 10.7.

10.2 Enclosure strength

As specified in 14.2.2 of IEC 60974-1:2012.

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