IEC 60974-5

Edition 2.0 2007-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Withdrawn

Arc welding equipment – Part 5: Wire feeders

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

IEC 60974-5:2007

Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007

THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2007 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.
If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.
Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub
The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.
- IEC Just Published: www.iec.ch/online_news/justpub
Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.
- Electropedia: www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.
- Customer Service Centre: www.iec.ch/webstore/custserv
If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:
Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm
Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,…). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.
- Just Published CEI: www.iec.ch/online_news/justpub
Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.
- Electropedia: www.electropedia.org
Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.
- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:
Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

Withdrawn

Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007

IEC 60974-5

Edition 2.0 2007-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

withdrawn

Arc welding equipment – Part 5: Wire feeders

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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX

R

ICS 25.160

ISBN 2-8318-9390-9

Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007

CONTENTS

FOREWORD 4

1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 Environmental conditions 7
5 Tests 7
5.1 Test conditions 7
5.2 Measuring instruments 8
5.3 Conformity of components 8
5.4 Type tests 8
5.5 Routine tests 8
6 Protection against electric shock 8
6.1 Insulation 8
6.2 Protection against electric shock in normal service (direct contact) 8
6.2.1 Protection provided by the enclosure 8
6.2.2 Capacitors 9
6.2.3 Automatic discharge of input capacitors 9
6.3 Protection against electric shock in case of a fault condition (indirect contact) 9
6.3.1 Isolation of the supply circuit and the welding circuit 9
6.3.2 Isolation of the welding circuit from the frame 9
6.3.3 Internal conductors and connections 10
6.4 Rated supply voltage 10
6.5 Protective provisions 10
6.6 Overcurrent protection of the supply circuit 10
6.7 Cable anchorage 10
6.8 Auxiliary power output 10
6.9 Inlet opening 10
6.10 Control circuits 11
6.11 Insulation of hanging means 11
7 Liquid cooling system 11
8 Shielding gas supply 11
9 Thermal requirements 11
10 Mechanical provisions 12
10.1 Wire feeder 12
10.2 Enclosure strength 12
10.3 Handling means 12
10.4 Drop withstand 12
10.5 Tilting stability 12
10.6 Filler wire supply 13
10.6.1 Filler wire supply mounting 13
10.6.2 Wire spool retaining device 13
10.6.3 Filler wire over-run 13
10.7 Feeding 13
10.8 Protection against mechanical hazards 13
11 Rating plate 14

Withdrawn

AVA Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007

11.1 General 14
11.2 Description 14
11.3 Contents 15
12 Indication of wire-feed speed 15
13 Instructions and markings 16
13.1 Instructions 16
13.2 Markings 16

Annex A (normative) Determination of the variation in wire-feed speed 18
Annex B (informative) Example for a rating plate of a stand-alone wire feeder 20

Figure 1 – Principle of the rating plate of stand-alone wire feeder 15

Table 1 – Minimum degree of protection 9

Withdrawn

Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ARC WELDING EQUIPMENT –

Part 5: Wire feeders

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 nongovernmental 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.
2) The formal decisions or agreements of 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

This second edition cancels and replaces the first edition published in 2002 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;
– IEC 60974-5 is not applicable to spool-on torches that IEC 60974-7 covers (see Clause 1);
– IEC 60974-5 is not applicable to wire feeders which are designed for use by laymen that IEC 60974-6 covers (see Clause 1);
– wire feeders with degree of protection IP23S may be stored, but are not intended to be used outside during precipitation unless sheltered (see 6.2.1 and Table 1);
– withdrawal of voltage limitation for input supply network (see 6.4);
– protective connection provision for welding circuit (see 6.5);

Withdrawn

AVA Documents Document Sharing Hub

Full document details: IEC 60974-5 2007

– addition of tilting stability (see 10.5);
– clarification of the definition of the thermal requirement test. The manufacturer gives the maximum load (see Clause 9);
– introduction of rating plate layout for stand-alone wire feeder (see 11.2);
– introduction of new combined symbols for liquid/gas input and output based on IEC 60974-1 (see 13.2).

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

FDIS	Report on voting
26/364/FDIS	26/368/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 3.

This standard shall be used in conjunction with IEC 60974-1 and IEC 60974-7.

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.

Withdrawn

Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007

ARC WELDING EQUIPMENT –

Part 5: Wire feeders

Withdrawn

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 for use by laymen and are covered by IEC 60974-6.

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

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60974-1:2005, *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*

3 Terms and definitions

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

3.1
crushing zone
place or area in which the human body or parts of the human body are exposed to a crushing hazard

NOTE This hazard will be generated, if two movable parts are moving towards each other or one movable part is moving towards a fixed part.

AVA Documents Document Sharing Hub

Full document details: IEC 60974-5 2007

3.2
drive rolls
rolls in contact with the filler wire and which transfer mechanical power to the filler wire

3.3
filler wire
filler metal in the form of a coil of wire

3.4
filler wire supply
source of filler wire and means for dispensing filler wire to the feeding mechanism

3.5
liner
component of the cable hose assembly through which the filler wire is fed

3.6
maximum load
value of the mechanical load that produces the rated supply current over the rated speed range

3.7
rated speed range
speed range of the filler wire specified by the manufacturer for each rated size of filler wire

3.8
rated supply current
I_1
r.m.s. value of an input current to the wire feeder at maximum load

3.9
wire electrode
solid or tubular filler wire which conducts welding current

3.10
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 The wire feed control may be integral with the wire feeder or in a separate enclosure.

3.11
wire feeder
equipment that delivers filler wire to the arc or weld zone which includes the wire-feed control and means to apply motion to the filler wire and may also include the filler wire supply

4 Environmental conditions

See Clause 4 of IEC 60974-1.

5 Tests

5.1 Test conditions

As specified in 5.1 of IEC 60974-1.

Withdrawn

Documents
Document Sharing Hub
Full document details: IEC 60974-5 2007

5.2 Measuring instruments

As specified in 5.2 of IEC 60974-1.

5.3 Conformity of components

As specified in 5.3 of IEC 60974-1.

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 (see 3.7 of IEC 60974-1);
b) insulation resistance (see 6.1.4 of IEC 60974-1 (preliminary check));
c) enclosure (see 14.2 of IEC 60974-1);
d) handling means (see 10.3);
e) drop withstand (see 10.4);
f) protection provided by the enclosure (see 6.2.1);
g) insulation resistance (see 6.1.4 of IEC 60974-1);
h) dielectric strength (see 6.1.5 of IEC 60974-1);
i) visual inspection (see 3.7 of IEC 60974-1).

The other tests included in this standard and not listed here may be carried out 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 (see 3.7 of IEC 60974-1);
b) continuity of the protective circuit, if applicable (see 10.4.2 of IEC 60974-1);
c) dielectric strength (see 6.1.5 of IEC 60974-1);
d) visual inspection (see 3.7 of IEC 60974-1).

6 Protection against electric shock

6.1 Insulation

See 6.1 of IEC 60974-1.

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

6.2.1 Protection provided by the enclosure

The minimum degree of protection for wire feeders shall be in accordance with Table 1.

Withdrawn

Documents
Document Sharing Hub
Full document details: IEC 60974-5 2007

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 See also 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.

Conformity shall be checked as specified in IEC 60529.

For this test, the filler wire shall be fed into the drive system and all external connectors shall be connected or covered.

The degree of water protection is met if, immediately after this test, the dielectric strength is verified as specified in 6.2.1 of IEC 60974-1.

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

See 6.2.2 of IEC 60974-1.

6.2.3 Automatic discharge of input capacitors

See 6.2.3 of IEC 60974-1.

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

6.3.1 Isolation of the supply circuit and the welding circuit

See 6.3.2 of IEC 60974-1.

NOTE Only one reinforced or double insulation between the welding circuit and the mains is required.

6.3.2 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 (see Tables 1 and 2 of IEC 60974-1).

Conformity shall be checked as specified in 6.1 of IEC 60974-1.

Withdrawn

AVA Documents Document Sharing Hub

Full document details: IEC 60974-5 2007

6.3.3 Internal conductors and connections

See 6.3.4 of IEC 60974-1.

6.4 Rated supply voltage

The rated supply voltage shall be supplied from a welding power source as specified in 11.5 of IEC 60974-1 or from the input 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 rated supply voltage is supplied by the welding circuit or 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.

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 10.5 of IEC 60974-1, except for those powered from the welding circuit.

6.8 Auxiliary power output

See 11.6 of IEC 60974-1.

6.9 Inlet opening

See 10.6 of IEC 60974-1.

Withdrawn

AVA Documents Document Sharing Hub

Full document details: IEC 60974-5 2007

6.10 Control circuits

See Clause 12 of IEC 60974-1.

6.11 Insulation 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 should 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 measurement and visual inspection while applying 0,75 MPa (7,5 bar) for 30 s.

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 while blocking the gas valve and applying an inlet pressure of 0,75 MPa (7,5 bar) for 30 s.

9 Thermal requirements

Wire feeders designed for use with manual torches shall be capable of operating under maximum load 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 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 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, incorporated in the wire feeder, shall be capable of carrying the rated welding current

Withdrawn

AVA Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007

a) without exceeding the temperature rating of the current-carrying components;

and

b) without causing the surface temperatures, specified in Table 7 of IEC 60974-1, to be exceeded.

Conformity shall be checked by measurement in accordance with 7.2 of IEC 60974-1 with the wire feeder loaded to the maximum load specified by the manufacturer.

10 Mechanical provisions

10.1 Wire feeder

A wire feeder shall be so constructed and assembled that it has the strength and rigidity necessary to withstand the normal service to which it is likely to be subjected, without increasing the hazard of electric shock or other hazard, whilst maintaining the minimum clearances required, and shall provide protection against hazardous moving parts (such as belts, pulleys, fans, gears, etc.).

After the tests in accordance with 10.1 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 increase a hazard.

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

Conformity shall be checked by visual inspection after meeting the requirements of 10.1 to 10.7.

10.2 Enclosure strength

See 14.2 of IEC 60974-1.

10.3 Handling means

See 14.3 of IEC 60974-1.

The conformity shall be checked with the wire feeder fitted with the maximum weight of filler wire for which the wire feeder is designed, and no other accessories shall be attached.

10.4 Drop withstand

See 14.4 of IEC 60974-1.

The conformity shall be checked with the wire feeder fitted with the maximum weight of the filler wire for which the wire feeder is designed, and no other accessories shall be attached.

Wire feeders intended for permanent mounting, for example, on mechanized equipment, need not be tested.

10.5 Tilting stability

See 14.5 of IEC 60974-1.

Withdrawn

AVA Documents
Document Sharing Hub

Full document details: IEC 60974-5 2007