BS EN 60974-5:2013

BSI Standards Publication

Arc welding equipment

Part 5: Wire feeders

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National foreword

This British Standard is the UK implementation of EN 60974-5:2013. It is identical to IEC 60974-5:2013. It supersedes BS EN 60974-5:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/6, Electric arc welding equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Arc welding equipment - Part 5: Wire feeders

(IEC 60974-5:2013)

Matériel de soudage à l'arc - Partie 5: Dévidoirs (CEI 60974-5:2013)

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CENELEC

European Committee for Electrotechnical Standardization
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Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Foreword

The text of document 26/503/FDIS, future edition 3 of IEC 60974-5, prepared by IEC/TC 26 "Electric welding" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60974-5:2013.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-03-27
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-06-27

This document supersedes EN 60974-5:2008.

EN 60974-5:2013 includes the following significant technical changes with respect to EN 60974-5:2008:

– changes induced by the publication of EN 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.

This standard is to be read in conjunction with EN 60974-1.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 60974-5:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60974-6	NOTE	Harmonised as EN 60974-6.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60050-195	-	International Electrotechnical Vocabulary (IEV) - Chapter 195: Earthing and protection against electric shock	-	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-
IEC 60974-1	2012	Arc welding equipment - Part 1: Welding power sources	EN 60974-1	2012
IEC 60974-7	-	Arc welding equipment - Part 7:Torches	EN 60974-7	-
IEC 60974-10	-	Arc welding equipment - Part 10: Electromagnetic compatibility (EMC) requirements	EN 60974-10	-
IEC 61140	-	Protection against electric shock - Common aspects for installation and equipment	EN 61140	-

CONTENTS

ARC WELDING EQUIPMENT –

Part 5: Wire feeders

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.

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:

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.

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.

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.

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.

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.

10.3 Handling means

As specified in 14.3 of IEC 60974-1:2012.

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

As specified in 14.4 of IEC 60974-1:2012.

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

As specified in 14.5 of IEC 60974-1.

10.6 Filler wire supply

10.6.1 Filler wire supply mounting

The filler wire supply mounting shall have the strength and rigidity necessary to support the maximum weight of the filler wire, as recommended by the manufacturer.

Conformity shall be checked by visual inspection and meeting the requirements of 10.4.

10.6.2 Wire spool retaining device

The retaining device for the wire spool shall be so designed that, during normal rotation, starts and stops, the retaining device shall not come loose or allow the wire spool to fall off its mounting, in all wire feeder support configurations as defined by the manufacturer.

NOTE 1 Wire feeders are designed to be supported on horizontal surface, hanging or both.

Conformity shall be checked by visual inspection after the following test.

The filler wire supply is fitted with the maximum weight of filler wire recommended by the manufacturer. The wire feeder is positioned at a 15° angle to the horizontal in such a direction as to produce the maximum loading on the wire spool retaining device and in the worst case wire feeder support configuration as specified by the manufacturer. The wire feeder is operated at the maximum speed with 100 starts and stops in all specified support configurations. No loosening of the retaining device shall be observed.

NOTE 2 Worst cases can include wire feeders with open door or cover.

10.6.3 Filler wire over-run

A device shall limit filler wire over-run from the wire spool, during its normal rotation, starting and stopping, and the minimum clearances as specified in Table 1 of IEC 60974-1:2012 shall be maintained.

Conformity shall be checked by measurement during the test of 10.7.

10.7 Feeding

The wire feeder shall be capable of feeding filler wire through a torch, as specified by the manufacturer. The maximum load is determined under the test condition described below.

Conformity shall be checked by the following test using the worst case type and size of filler wire and the worst case type and weight of wire spool, as specified by the manufacturer.

Wire-feed speed is measured (e.g. by tachometer, encoder or measurement of wire length for a measured time) at the minimum and the maximum control setting under the following conditions.

a) the cable hose assembly, when used, shall be positioned so as to have a 0,3 m radius loop beginning at the wire feeder. If the conduit is long enough to form one complete loop, any remaining length shall be straight;
b) the spool retaining device and the filler wire over-run device shall be adjusted in accordance with 10.6.2 and 10.6.3;
c) all components, for example, drive rolls, wire straighteners, tips, liners, etc. are in place, adjusted and in the condition in which they are normally supplied for welding.

Conformity is met if the wire feeds and the measured speed at the minimum control setting is equal to, or less than, the minimum of the rated speed range and the measured speed at the maximum control setting is equal to, or greater than, the maximum of the rated speed range.

10.8 Protection against mechanical hazards

The wire feeder shall provide protection against

a) unintentional hazardous contact with moving parts (i.e. drive rolls, gears) during operation;

NOTE Contact with a moving part is not necessarily a hazard.

EXAMPLE 1 Protection can be achieved by design of the wire feeder gear or recessing the part behind the plane of access or use of a hinged cover or protective guard.

b) crushing of parts of the human body during
   1) threading of the filler wire into the feeder;

      EXAMPLE 2 Protection can be achieved by

      – using a low speed for threading the filler wire;
      – a momentary jog of the filler wire that remains only as long as a switch is actuated (hold-to-run control);
      – a wire-feed mechanism designed to thread the filler wire into the drive system without having to switch on the drive motor.

   2) operation of the wire spool;

      EXAMPLE 3

      Protection can be achieved by designing an enclosure for the wire spool with the instruction that the wire feeder shall be operated with the enclosure in place.

      Protection of an unenclosed wire spool to avoid crushing the fingers between the frame and the wire spool can be achieved by including at least one of the following:

      – a maximum distance between frame and wire spool not to exceed 6 mm;
      – a minimum distance between frame and wire spool of at least 30 mm;
      – deterring devices, for example, deflector, to avoid a pinch point (distance between frame and wire spool smaller than 30 mm).

Conformity shall be checked by visual inspection.

11 Rating plate

11.1 General

A clearly and indelibly marked rating plate shall be fixed securely to, or printed on, each stand-alone wire feeder.

Conformity shall be checked by visual inspection and the durability test specified in 15.1 of IEC 60974-1:2012.

11.2 Description

The rating plate shall be divided into two sections:

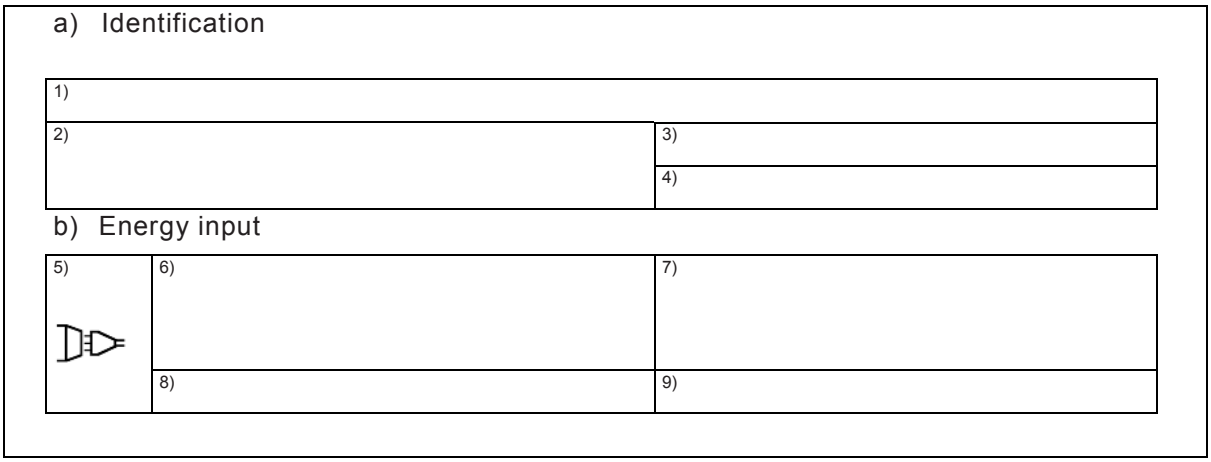
a) identification of stand-alone wire feeder;

b) energy input of stand-alone wire feeder.

The arrangement and sequence of the data shall comply with the principle shown in Figure 1 (for an example, see Annex B).

The dimensions of the rating plate are not specified and may be chosen freely.

NOTE Additional information can be given, if necessary, on a special rating plate. Further useful information may be given in technical literature supplied by the manufacturer (as specified in Clause 13).



IEC 2217/07

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

11.3 Contents

a) Identification

Box 1 Name and address of the manufacturer and if required distributor, importer, a trade mark and the country of origin.

Box 2 Type (identification) as given by the manufacturer.

Box 3 Traceability of design and manufacturing data (for example, serial number).

Box 4 Reference to this standard confirming that the wire feeder complies with its requirements.

b) Energy input

Box 5  Symbol for input supply (as specified in 6.4).

Box 6 U_1 Rated supply voltage(s).

Box 7	I_1	Rated supply current(s) at maximum load (not required for stand-alone wire feeder dedicated to a specific power source).
Box 8	IP	Degree of protection for motor and control.
Box 9	I_2	Rated welding current at 100 % (continuous load) or 60 % duty cycle or both at an ambient temperature of 40 °C. This rating is only applicable if the wire feeder is a part of the welding circuit.

12 Indication of wire-feed speed

Where an indication of wire-feed speed is given in m/min, or optionally in inch/min, the accuracy of the indication shall be:

a) between 100 % and 25 % of the maximum setting: ± 10 % of the true value;

b) below 25 % of the maximum setting: ± 2,5 % of the maximum setting.

When other data are given for the maximum variation of the wire-feed speed with respect to load, to supply voltage and to temperature rise, they are determined according to Annex A.

Conformity shall be checked by measurement and calculation over the range of adjustment, using the conditions specified in 10.7.

13 Instructions and markings

13.1 Instructions

The instructions delivered with each wire feeder shall include the following, as applicable:

a) general description;

b) correct methods of handling;

c) meanings of indications, markings and graphical symbols;

d) interface requirements for the arc welding power source, for example, control power, control signals, static characteristics and means of connection;

e) size, type and maximum weight of suitable wire spools;

f) maximum and minimum diameter of filler wire;

g) rated speed range;

h) maximum gas pressure, i.e. 0,5 MPa (5 bar);

i) correct operational use of the wire feeder, for example, wire diameter, wire type, drive rolls and torch specification;

j) welding capability, limitations of duty and explanation of thermal protection;

k) limitations of use relating to the degree of protection provided;

l) maintenance of the wire feeder, such as recommended cycles for partial and complete test and other operation (for example cleaning);

m) a list of parts typically replaced due to wear;

n) precautions against toppling over, if the wire feeder shall be placed on a tilted plane;

o) basic guidelines regarding protection against mechanical hazards for operators, for example, not to wear gloves during threading the filler wire and changing the wire spool;

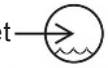
p) EMC classification in accordance with IEC 60974-10 (stand-alone wire feeder only).

Other useful information may be given, for example, class of insulation, pollution degree, how to connect to computer control systems, etc.

Conformity shall be checked by reading the instructions.

13.2 Markings

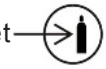
The inlet and outlet connections for the cooling liquid and the shielding gas shall be clearly and indelibly marked with the following symbols:

a) Liquid inlet 

Alternatively a colour code may be used.

b) Liquid outlet 

Alternatively a colour code may be used.

c) Gas inlet 

d) Gas outlet 

Annex A
(normative)

Determination of the variation in wire-feed speed

A.1 With respect to load change

The variation in wire-feed speed within the rated speed setting, when the load is varied from half of the maximum load to the maximum load as determined in 10.7, is determined by the following formula:

$$r_{\mathrm{I}} = \frac{v_{\mathrm{I1}} - v_{\mathrm{I2}}}{v_{\mathrm{I2}}} \times 100 \quad (\%)$$

where

r_{I} is the variation in wire-feed speed due to load change (%);

v_{I1} is the wire-feed speed at half of the maximum load (m/min);

v_{I2} is the wire-feed speed at maximum load (m/min).

The wire feeder shall be operated for at least 0,5 h at half the maximum load before making this test.

The maximum value of the variation r_{I} is taken.

A.2 With respect to supply voltage change

The variation in wire-feed speed throughout all loads within the rated speed setting, when the supply voltage is varied within ± 10 % of the rated supply voltage, is determined by the following formula:

$$r_{\mathrm{U}} = \frac{v_{\mathrm{U1}} - v_{\mathrm{U2}}}{v_{\mathrm{U2}}} \times 100 \quad (\%)$$

where

r_{U} is the variation in wire-feed speed due to supply voltage change (%);

v_{U1} is the wire-feed speed at ± 10 % of the rated supply voltage (m/min);

v_{U2} is the wire-feed speed at rated supply voltage (m/min).

The wire feeder shall be operated for at least 0,5 h at half the maximum load before making this test.

The maximum value of the variation r_{U} is taken.

A.3 With respect to temperature rise

The variation in wire-feed speed at maximum load within the rated speed setting, due to the temperature rise of the wire feeder from ambient air temperature to operating temperature, is determined by the following formula:

$$r_{\mathrm{t}} = \frac{v_{\mathrm{t1}} - v_{\mathrm{t2}}}{v_{\mathrm{t2}}} \times 100 \quad (\%)$$

where

r_t is the variation in wire-feed speed due to temperature rise (%);

v_{t1} is the wire-feed speed at ambient air temperature (m/min);

v_{t2} is the wire-feed speed at operating temperature (m/min).

The ambient air temperature shall be stated within the range of temperature specified in Clause 4 and maintained within a tolerance of ± 5 °C during the test.

The maximum value of the variation r_t is taken.

Annex B
(informative)

Example for a rating plate of a stand-alone wire feeder

a) Identification

1) Manufacturer Address	Trademark
2) Type	3) Serial No.
	4) **IEC 60974-5**

b) Energy input

5) 	6) U_1 = 42 V	7) I_1 = 2 A
	8) IP 23S	9) I_2 = 500 A (60 %) / 400 A (100 %)

Bibliography

IEC 60417, *Graphical symbols for use on equipment* (available at <http://www.graphical-symbols.info/equipment>)

IEC 60974-6, *Arc welding equipment – Part 6: Limited duty equipment*

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