IEC 60974-12

Edition 4.0 2022-07
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Arc welding equipment –
Part 12: Coupling devices for welding cables

IEC 60974-12:2022-07 RLV(en)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
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 corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC 60974-12

Edition 4.0 2022-07
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Arc welding equipment –
Part 12: Coupling devices for welding cables

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.160.30

ISBN 978-2-8322-3980-3

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

ARC WELDING EQUIPMENT –

Part 12: Coupling devices for welding cables

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.
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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
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.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60974-12:2011. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60974-12 has been prepared by IEC technical committee 26: Electric welding. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) updated Table 1 to include 100 % duty cycle;

b) updated Annex A to provide more detail.

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

Draft	Report on voting
26/734/FDIS	26/736/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

In this document, the following print types are used:

– *conformity statements*: *in italic type*;

– terms used throughout this document which have been defined in Clause 3: SMALL ROMAN CAPITALS.

A list of all parts of the IEC 60974 series can be found, under the general title *Arc welding equipment*, on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

ARC WELDING EQUIPMENT –

Part 12: Coupling devices for welding cables

1 Scope

This part of IEC 60974 is applicable to COUPLING DEVICES for cables used in arc welding and allied processes, designed for connection and disconnection without using tools.

This part of IEC 60974 specifies safety and performance requirements of COUPLING DEVICES.

This part of IEC 60974 is not applicable to COUPLING DEVICES for underwater welding.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60974-1:2021, *Arc welding equipment – Part 1: Welding power sources*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
COUPLING DEVICE
device connecting two welding cables together or connecting a welding cable to welding equipment

3.2
RETAINING MEANS
mechanical arrangement that holds the COUPLING DEVICE in position and prevents an unintentional withdrawal, when properly connected

3.3
ARC STRIKING ~~and stabilizing~~ VOLTAGE
voltage superimposed on the welding circuit to ~~initiate or maintain~~ ignite the arc

3.4
ARC STABILIZING VOLTAGE
voltage superimposed on the arc voltage to maintain the arc

4 Environmental conditions

The COUPLING DEVICE shall be capable of operation when the following environmental conditions prevail:

a) range of ambient air temperature:
   – during operation: −10 °C to + 40 °C;
b) relative humidity of the air: up to 90 % at 20 °C.

~~The coupling device shall withstand storage and transport at an ambient air temperature of −20 °C to + 55 °C without any damage to function and performance.~~

5 ~~Type~~ Tests

5.1 Test conditions

All type tests shall be carried out on the same new and completely assembled COUPLING DEVICE.

All type tests shall be carried out at an ambient air temperature between 10 °C and 40 °C.

~~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) temperature measuring devices: ±2 K.~~

5.2 Measuring instruments

As specified in 5.2 of IEC 60974-1:2021.

5.3 Test sequence

The type tests given below shall be carried out in the following sequence:

a) general visual inspection;
b) temperature rise, see 8.1;
c) crush strength, see 9.5;
d) insulation resistance, see 7.2;
e) dielectric strength, see 7.3.

The other type tests in this document not mentioned above ~~may~~ can be carried out in any convenient sequence.

6 Designation

COUPLING DEVICES shall be designated by the range of cross-sectional area of the welding cable intended to be connected. The test current ~~at an ambient air temperature of 40 °C~~ is given in Table 1 based on maximum cross-section area. The welding COUPLING DEVICE shall accept the minimum cross-sectional area as given in Table 1. It is possible that a reduced minimum cross-sectional area ~~may~~ be ~~reduced~~ specified to extend the COUPLING DEVICE fitting range.

NOTE Current capacity of welding cables is given in Table D.4 of EN 50565-1:2014. The 60 % duty cycle current rating relates to 25 °C of this table.

Table 1 – Relation between COUPLING DEVICE test current and welding cables' cross-sectional area

Range of cross-sectional area mm^2	COUPLING DEVICE test current at 60 % duty cycle A
1 to 6	80
~~up~~ 6 to 10	125
10 to 16	150
16 to 25	200
25 to 35	250
35 to 50	300
50 to 70	400
70 to 95	500
95 to 120	600
NOTE ~~Welding cables are rated based on cross-sectional area.~~ Test current is defined in order that COUPLING DEVICE withstands the rated current of the welding cable.	

Conformity shall be checked by measurement.

7 Protection against electric shock

7.1 Voltage rating

COUPLING DEVICES shall be rated in accordance with the process as given in Table 2 and the ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE if applicable.

Table 2 – Voltage rating of COUPLING DEVICES

Process	Voltage rating V peak	Insulation resistance MΩ	Dielectric strength V RMS	Degree of protection in accordance with IEC 60529
All processes except plasma cutting	113	2,5	1 000	IP 3X
Plasma cutting	500	2,5	2 100	IP 3X

7.2 Insulation resistance

The insulation resistance of a new COUPLING DEVICE shall, after the humidity treatment, be not less than 2,5 MΩ.

Conformity shall be checked by the following test.

a) Humidity treatment

A humidity cabinet is maintained at a temperature t between 20 °C and 30 °C and a relative humidity between 91 % and 95 %.

The COUPLING DEVICE without cables fitted is brought to a temperature between t and t + 4 K and is then placed for 48 h in the humidity cabinet.

b) Insulation resistance measurement

Immediately after the humidity treatment, the COUPLING DEVICE is wiped clean and tightly wrapped in a metal foil covering the external surface of the insulation.

The insulation resistance is measured by application of a DC voltage of 500 V between the live parts and the metal foil, the reading being made after stabilization of the measurement.

7.3 Dielectric strength

7.3.1 General requirement

The insulation shall withstand an AC test voltage of 2 100 V RMS for plasma cutting or 1 000 V RMS for all other processes without flashover or break down. Any discharges unaccompanied by a voltage drop are disregarded.

Conformity shall be checked by the following test.

The COUPLING DEVICE is wiped clean and tightly wrapped in a metal foil covering the external surface of the insulation.

The AC test voltage shall be of an approximate sine waveform with a peak value not exceeding 1,45 times the RMS value, having a frequency of 50 Hz or 60 Hz, applied for 1 min between the live parts and the metal foil.

7.3.2 Additional requirements for ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE rating

For couplers for use with ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE, the insulation shall withstand the rated peak ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE as rated by the manufacturer. The insulation shall withstand a high frequency voltage of pulse width 0,2 µs to 8 µs, a repetition frequency of 50 Hz to 300 Hz and shall be 20 % higher than the rated peak ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE as determined by the manufacturer.

Conformity shall be checked by the following test.

For couplers intended for use with ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE, the couplers shall be subjected to the high-frequency test voltage. The full value of the high-frequency voltage is applied for 2 s between the electrode circuit, and

a) conductive surfaces;

b) other isolated circuits.

Flashover or breakdown shall not occur. Any discharges unaccompanied by a voltage drop (corona) are disregarded.

Alternatively, for couplers intended for use with ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE, an AC test voltage of approximately sine waveform at 50 Hz or 60 Hz ~~may~~ can be used.

7.4 Protection of live parts against unintentional contact

Parts designed to carry welding current and likely to be live after disconnection shall be recessed to a depth of at least 10 % of the internal diameter of the insulation with a minimum depth of 2 mm with respect to the insulating body.

As a consequence, insulation ~~has to~~ shall be able to withstand normal service conditions so that the protecting length is maintained during the life of the COUPLING DEVICE.

Conformity shall be checked by linear measurement and visual inspection.

8 Thermal rating

8.1 Temperature rise

The temperature rise caused by the current passing through a COUPLING DEVICE normally coupled and fitted with an untinned copper welding cable of maximum cross-sectional area as indicated in Table 1 shall not exceed 45 K at the hottest spot of the external surface.

Conformity shall be checked by the following test.

The COUPLING DEVICE is normally coupled and fitted with at least 2 m long welding cables. The COUPLING DEVICE is suspended by its welding cables from two wooden laths 1 m apart, hanging between the two laths in the horizontal plane about 200 mm above the ground in a draught-free area.

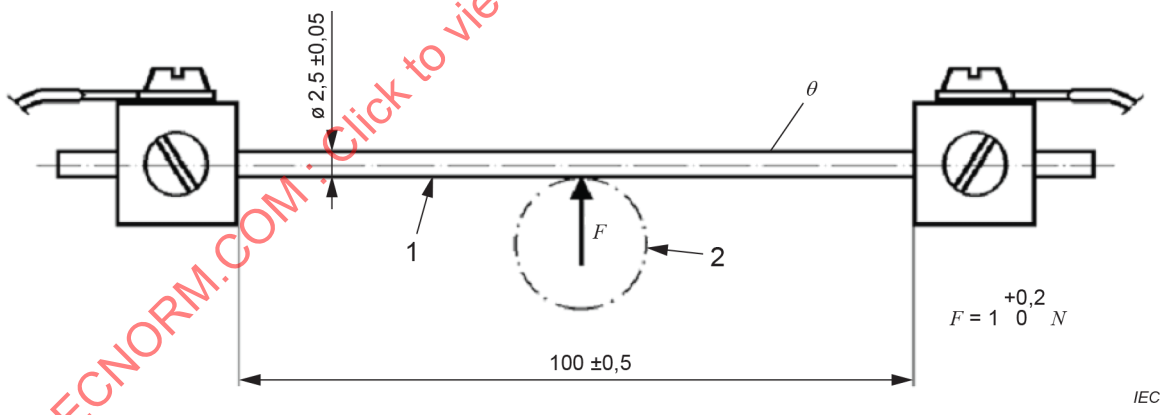
A continuous DC current equal to 75 % of the test current (equivalent to approximately 60 % duty cycle) is passed through the COUPLING DEVICE until the rate of the temperature rise does not exceed 2 K/h. During the total test time, the DC current shall be kept constant with a tolerance of ± 2 %.

8.2 Resistance to hot objects

The insulation shall be capable of withstanding hot objects and the effects of a normal amount of weld spatter without being ignited or becoming unsafe.

Conformity shall be checked with a device in accordance with Figure 1.

Dimensions in millimetres



Key

1 18/8 chrome-nickel steel rod

2 COUPLING DEVICE

θ test temperature

Figure 1 – Device for testing the resistance to hot objects

An electric current (of approximately 25 A) is passed through the 18/8 chrome-nickel steel rod until a steady-state temperature θ of $300\ ^{+5}_{0}$ °C is reached. During the test, the temperature of the heated rod shall be maintained. This temperature will be measured by a contact thermometer or thermocouple.

The heated rod in a horizontal position is then applied for 2 min to the insulation at the weakest point (for example, minimum insulation thickness and closest distance to live parts). The heated rod shall not penetrate through the insulation and contact live parts.

An attempt is made to ignite any gases which ~~may~~ can be emitted in the region of the contact point by means of an electric spark or small flame. If the gases are flammable, the burning shall stop as soon as the heated rod is removed.

9 Mechanical requirements

9.1 RETAINING MEANS

A RETAINING MEANS shall be provided to prevent the unintentional separation of the COUPLING DEVICE as a result of a longitudinal pull.

NOTE If possible, indicating marks, for example two lines opposite each other, ~~should~~ show by visual inspection that the RETAINING MEANS has functioned.

Conformity shall be checked by manual operation and visual inspection.

9.2 Welding cable entry

The cable entry of a cable coupler shall be designed to prevent damage to the cable ~~due to flexing~~ insulation causing exposed conductors.

Conformity shall be checked by bending the cable through an angle of 90°. Verify that there are no exposed conductors by visual inspection.

9.3 Penetration of the welding cable insulation

The design of cable couplers shall be such that the insulation of the cables can enter to a depth of at least twice the outer diameter of the welding cable with a minimum of 30 mm.

Conformity shall be checked by measurement with a welding cable of the maximum cross-sectional area as specified by the manufacturer.

9.4 Welding cable connection

The design of the COUPLING DEVICE shall be such that welding cables with a cross-sectional area within the range as specified by the manufacturer can be replaced. The connection shall withstand the mechanical stress of the tensile test without separation.

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

A plug, a connector or a plug connector is fitted in accordance with the manufacturer's instructions, with a welding cable of maximum cross-sectional area. The connection is subjected to 10 pulls with a force of 40 N/mm^2 of the cross-sectional area with a maximum of 2 000 N applied to the welding cable. The force of each pull is gradually increased from zero to the specified value in 1 s and maintained for 1 s.

After the test, the conductor shall not have been ~~noticeably~~ displaced by more than 2 mm.

This test shall be repeated with a welding cable having the minimum permissible cross-sectional area as specified by the manufacturer.

If more than one method of cable fixing is provided, all methods shall be tested.

9.5 Crush strength

COUPLING DEVICES shall withstand the mechanical stress of the crush test without the insulation being destroyed or the mechanical functioning being impaired.

Conformity shall be checked by the following test, manual operation and visual inspection.

A cable coupler connected and fitted, in accordance with the manufacturer's instructions, with welding cables of maximum cross-sectional area is placed between the parallel plates of a press, the axis of the cable coupler being at a right angle to the direction of the crush force.

The crush force ~~is applied and gradually increased up~~ can be slowly raised over a maximum period of 10 s to the full value given in Table 3 . This crush force shall be maintained at the full value for 10 s.

Table 3 – Crush force

Cross-sectional area of welding cable mm^2	Crush force N
up to 25	1 200
25 to 50	1 500
above 50	2 000

This test shall be repeated with a welding cable of minimum cross-sectional area as specified by the manufacturer.

9.6 Dimensions

COUPLING DEVICES shall be designed in accordance with dimensions given in Annex A.

10 Marking

The following information shall be legibly and indelibly marked on COUPLING DEVICES designed to be attached to welding cables:

a) name of the manufacturer, distributor, importer or the registered trademark;

b) maximum permissible cross-sectional area of the welding cable;

c) minimum permissible cross-sectional area of the welding cable;

d) rated peak ARC STRIKING VOLTAGE ~~and~~ or ARC STABILIZING VOLTAGE if applicable;

e) reference to this document, confirming that the COUPLING DEVICE complies with the requirements.

For COUPLING DEVICES having a maximum permissible cross-sectional area less than or equal to 16 mm^2, the dimensions of which are such that it is not possible to put on all the markings clearly, item c) can be omitted and shown on the packing or in the literature.

COUPLING DEVICES designed to be mounted on a panel ~~need~~ shall not be marked.

Conformity shall be checked by reading the marking.

11 Instructions for use

Each COUPLING DEVICE shall be delivered with an instruction sheet which includes the following information:

a) correct coupling and uncoupling of the COUPLING DEVICE;
b) correct connection of the welding cable;
c) choice of welding cable, type and size;
d) relation of permissible current and duty cycle.

Conformity shall be checked by reading the instructions.

Annex A
(normative)

Dimensions

COUPLING DEVICES in accordance with this document shall have the dimensions as specified in Figure A.1, Figure A.2, Figure A.3, Figure A.4, Figure A.5 and in Table A.1.

~~NOTE The locking pin can be optionally cylindrical, conical or prismatic.~~

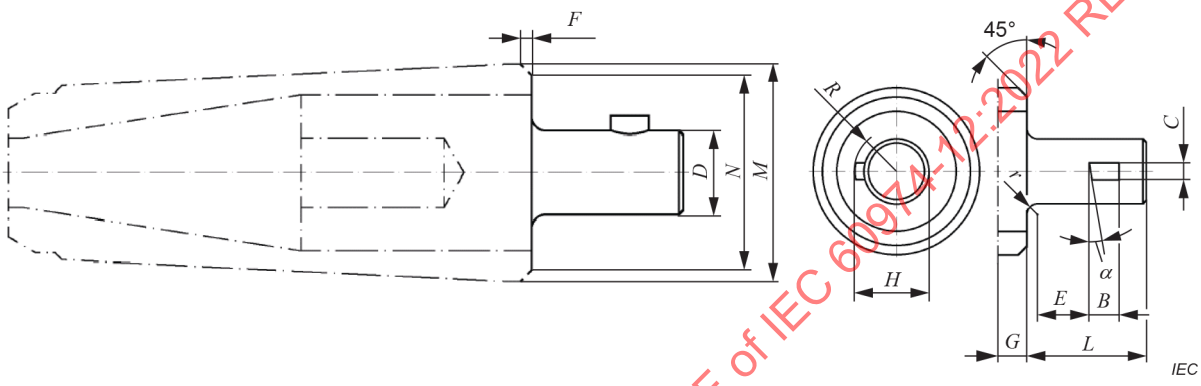


Figure A.1 – Male element

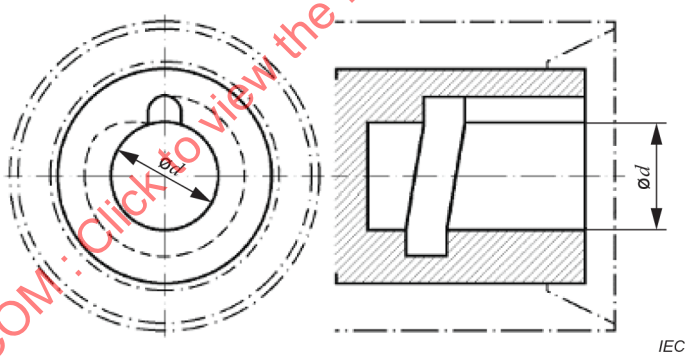


Figure A.2 – Female element

Dimensions and details not specified in Figure A.1 and Figure A.2 and Table A.1 are left to the discretion of the manufacturer.

Table A.1 – Dimensions for Figure A.1, Figure A.2, Figure A.3, Figure A.4, and Figure A.5

Dimension		Dimension in millimetres or degrees		
		Type 1	Type 2	Type 3
α		4	5	1°40'
r		0,4	0,4	0,4
d		$9^{+0,08}_{+0,02}$	$13^{+0,08}_{+0,02}$	$15^{+0,08}_{+0,02}$
R	max.	5,6	8,7	10
N	max.	16	27	30
M	max.	26	40	45
H	max.	~~11~~ 10,5	~~15,5~~ 15,47	17,5
G	min.	6,5	7	7
F	min.	2	2,5	6
$E + r$		$4,65^{+0,1}_{0}$	$10,04^{+0,1}_{0}$	$15^{+0,1}_{0}$
D		$9^{-0,01}_{-0,1}$	$13^{-0,01}_{-0,1}$	$15^{-0,01}_{-0,1}$
C	max.	4,5	5,2	6
$C2$	max.	3,6	~~4,4~~	-
B	max.	4,5	5,2	6
L	max.	12	20	26

The locking pin can by cylindrical, conical or prismatic and shall not violate the maximum outlines specified in Figure A.3, Figure A.4, and Figure A.5.

NOTE The locking pin shape does not necessarily follow the max outline shape.

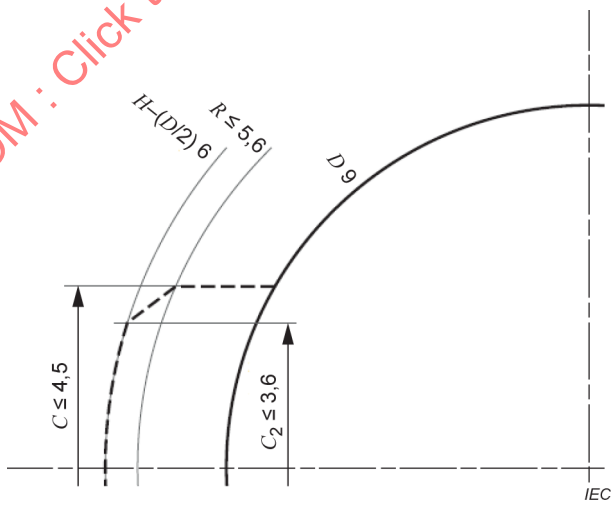


Figure A.3 – Type 1 locking pin maximum outline shape

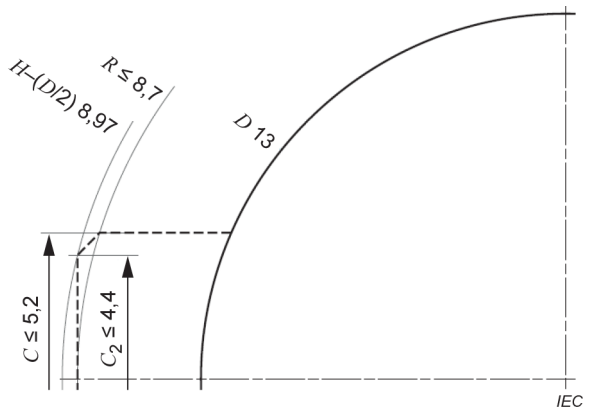


Figure A.4 – Type 2 locking pin maximum outline shape

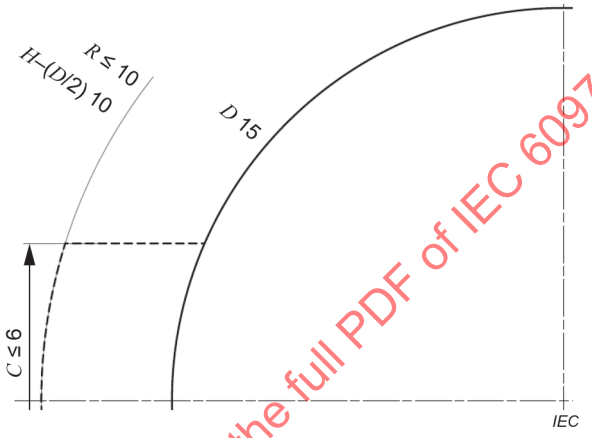


Figure A.5 – Type 3 locking pin maximum outline shape

Bibliography

IEC Guide 116, *Guidelines for safety related risk assessment and risk reduction for low voltage equipment*

EN 50565-1:2014, *Electric cables – Guide to use for cables with a rated voltage not exceeding 450/750 V (U0/U) – Part 1: General guidance*

———————

IEC 60974-12

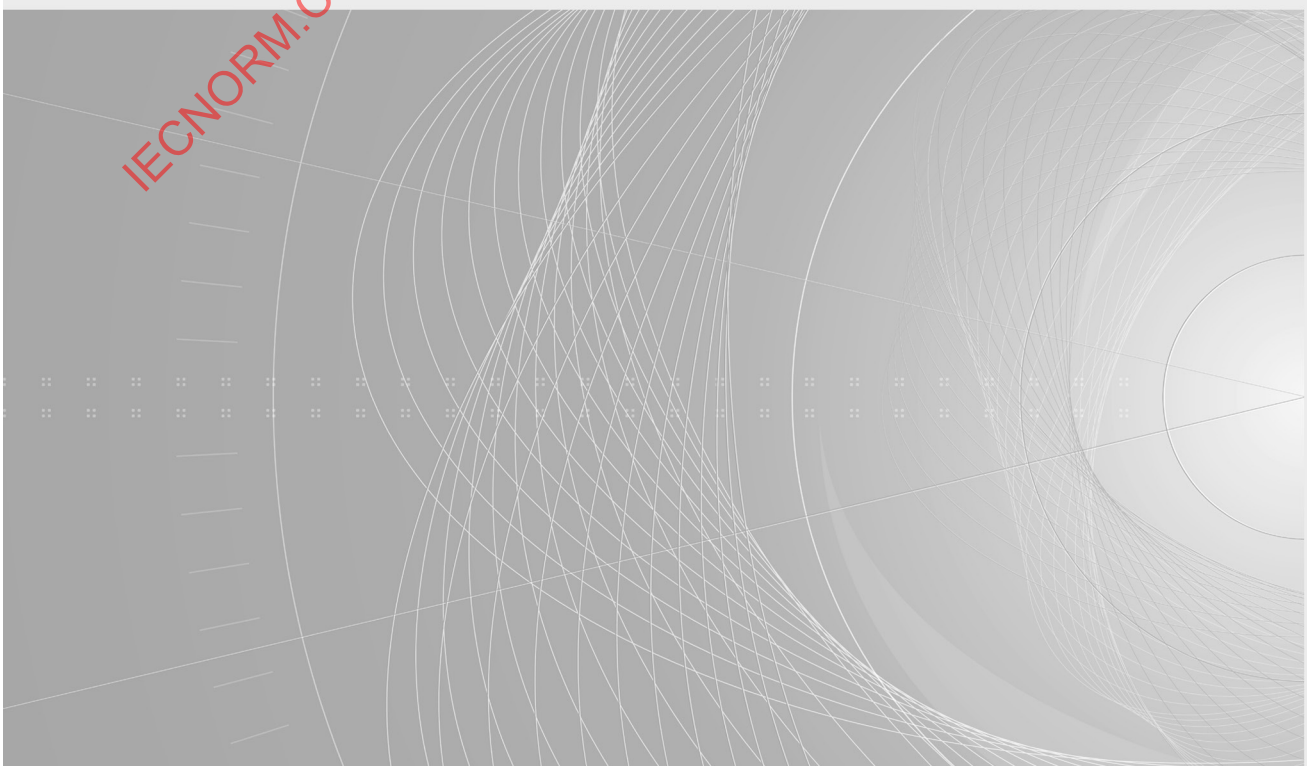
Edition 4.0 2022-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Arc welding equipment –
Part 12: Coupling devices for welding cables

Matériel de soudage à l'arc –
Partie 12: Dispositifs de connexion pour câbles de soudage



IEC 60974-12:2022-07(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

ARC WELDING EQUIPMENT –

Part 12: Coupling devices for welding cables

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.
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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
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.

IEC 60974-12 has been prepared by IEC technical committee 26: Electric welding. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) updated Table 1 to include 100 % duty cycle;
b) updated Annex A to provide more detail.

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

Draft	Report on voting
26/734/FDIS	26/736/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

In this document, the following print types are used:

– *conformity statements*: *in italic type*.
– terms used throughout this document which have been defined in Clause 3: SMALL ROMAN CAPITALS.

A list of all parts of the IEC 60974 series can be found, under the general title *Arc welding equipment*, on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

ARC WELDING EQUIPMENT –

Part 12: Coupling devices for welding cables

1 Scope

This part of IEC 60974 is applicable to COUPLING DEVICES for cables used in arc welding and allied processes, designed for connection and disconnection without using tools.

This part of IEC 60974 specifies safety and performance requirements of COUPLING DEVICES.

This part of IEC 60974 is not applicable to COUPLING DEVICES for underwater welding.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60974-1:2021, *Arc welding equipment – Part 1: Welding power sources*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
COUPLING DEVICE
device connecting two welding cables together or connecting a welding cable to welding equipment

3.2
RETAINING MEANS
mechanical arrangement that holds the COUPLING DEVICE in position and prevents an unintentional withdrawal, when properly connected

3.3
ARC STRIKING VOLTAGE
voltage superimposed on the welding circuit to ignite the arc

3.4
ARC STABILIZING VOLTAGE
voltage superimposed on the arc voltage to maintain the arc

4 Environmental conditions

The COUPLING DEVICE shall be capable of operation when the following environmental conditions prevail:

a) range of ambient air temperature:
   – during operation: −10 °C to + 40 °C;
b) relative humidity of the air: up to 90 % at 20 °C.

5 Tests

5.1 Test conditions

All type tests shall be carried out on the same new and completely assembled COUPLING DEVICE.

All type tests shall be carried out at an ambient air temperature between 10 °C and 40 °C.

5.2 Measuring instruments

As specified in 5.2 of IEC 60974-1:2021.

5.3 Test sequence

The type tests given below shall be carried out in the following sequence:

a) general visual inspection;
b) temperature rise, see 8.1;
c) crush strength, see 9.5;
d) insulation resistance, see 7.2;
e) dielectric strength, see 7.3.

The other type tests in this document not mentioned above can be carried out in any convenient sequence.

6 Designation

COUPLING DEVICES shall be designated by the range of cross-sectional area of the welding cable intended to be connected. The test current is given in Table 1 based on maximum cross-section area. The welding COUPLING DEVICE shall accept the minimum cross-sectional area as given in Table 1. It is possible that a reduced minimum cross-sectional area be specified to extend the COUPLING DEVICE fitting range.

NOTE Current capacity of welding cables is given in Table D.4 of EN 50565-1:2014. The 60 % duty cycle current rating relates to 25 °C of this table.

Table 1 – Relation between COUPLING DEVICE test current and welding cables' cross-sectional area

Range of cross-sectional area mm^2	COUPLING DEVICE test current at 60 % duty cycle A
1 to 6	80
6 to 10	125
10 to 16	150
16 to 25	200
25 to 35	250
35 to 50	300
50 to 70	400
70 to 95	500
95 to 120	600
NOTE Test current is defined in order that COUPLING DEVICE withstands the rated current of the welding cable.	

Conformity shall be checked by measurement.

7 Protection against electric shock

7.1 Voltage rating

COUPLING DEVICES shall be rated in accordance with the process as given in Table 2 and the ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE if applicable.

Table 2 – Voltage rating of COUPLING DEVICES

Process	Voltage rating V peak	Insulation resistance MΩ	Dielectric strength V RMS	Degree of protection in accordance with IEC 60529
All processes except plasma cutting	113	2,5	1 000	IP 3X
Plasma cutting	500	2,5	2 100	IP 3X

7.2 Insulation resistance

The insulation resistance of a new COUPLING DEVICE shall, after the humidity treatment, be not less than 2,5 MΩ.

Conformity shall be checked by the following test.

a) Humidity treatment

A humidity cabinet is maintained at a temperature t between 20 °C and 30 °C and a relative humidity between 91 % and 95 %.

The COUPLING DEVICE without cables fitted is brought to a temperature between t and t + 4 K and is then placed for 48 h in the humidity cabinet.

b) Insulation resistance measurement

Immediately after the humidity treatment, the COUPLING DEVICE is wiped clean and tightly wrapped in a metal foil covering the external surface of the insulation.

The insulation resistance is measured by application of a DC voltage of 500 V between the live parts and the metal foil, the reading being made after stabilization of the measurement.

7.3 Dielectric strength

7.3.1 General requirement

The insulation shall withstand an AC test voltage of 2 100 V RMS for plasma cutting or 1 000 V RMS for all other processes without flashover or break down. Any discharges unaccompanied by a voltage drop are disregarded.

Conformity shall be checked by the following test.

The COUPLING DEVICE is wiped clean and tightly wrapped in a metal foil covering the external surface of the insulation.

The AC test voltage shall be of an approximate sine waveform with a peak value not exceeding 1,45 times the RMS value, having a frequency of 50 Hz or 60 Hz, applied for 1 min between the live parts and the metal foil.

7.3.2 Additional requirements for ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE rating

For couplers for use with ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE, the insulation shall withstand the rated peak ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE as rated by the manufacturer. The insulation shall withstand a high frequency voltage of pulse width 0,2 µs to 8 µs, a repetition frequency of 50 Hz to 300 Hz and shall be 20 % higher than the rated peak ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE as determined by the manufacturer.

Conformity shall be checked by the following test.

For couplers intended for use with ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE, the couplers shall be subjected to the high-frequency test voltage. The full value of the high-frequency voltage is applied for 2 s between the electrode circuit, and

a) conductive surfaces;

b) other isolated circuits.

Flashover or breakdown shall not occur. Any discharges unaccompanied by a voltage drop (corona) are disregarded.

Alternatively, for couplers intended for use with ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE, an AC test voltage of approximately sine waveform at 50 Hz or 60 Hz can be used.

7.4 Protection of live parts against unintentional contact

Parts designed to carry welding current and likely to be live after disconnection shall be recessed to a depth of at least 10 % of the internal diameter of the insulation with a minimum depth of 2 mm with respect to the insulating body.

As a consequence, insulation shall be able to withstand normal service conditions so that the protecting length is maintained during the life of the COUPLING DEVICE.

Conformity shall be checked by linear measurement and visual inspection.

8 Thermal rating

8.1 Temperature rise

The temperature rise caused by the current passing through a COUPLING DEVICE normally coupled and fitted with an untinned copper welding cable of maximum cross-sectional area as indicated in Table 1 shall not exceed 45 K at the hottest spot of the external surface.

Conformity shall be checked by the following test.

The COUPLING DEVICE is normally coupled and fitted with at least 2 m long welding cables. The COUPLING DEVICE is suspended by its welding cables from two wooden laths 1 m apart, hanging between the two laths in the horizontal plane about 200 mm above the ground in a draught-free area.

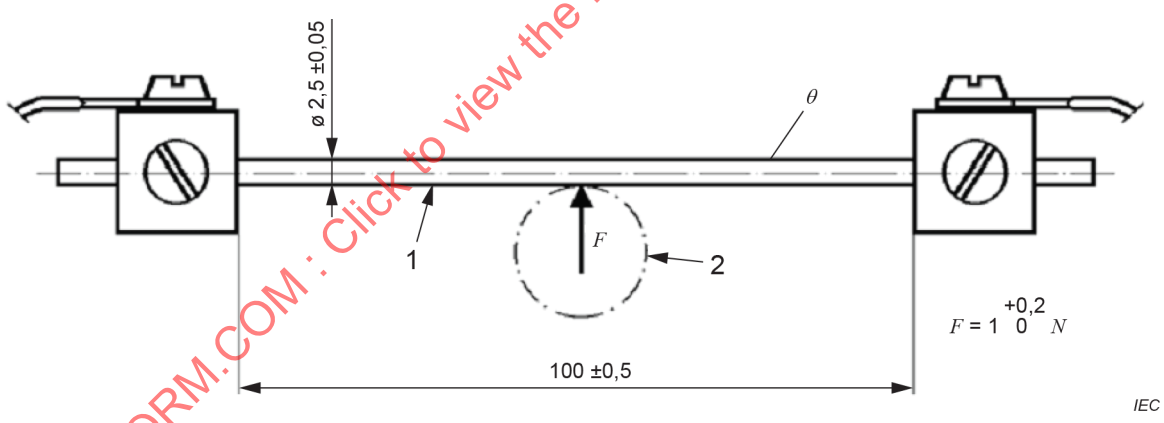
A continuous DC current equal to 75 % of the test current (equivalent to approximately 60 % duty cycle) is passed through the COUPLING DEVICE until the rate of the temperature rise does not exceed 2 K/h. During the total test time, the DC current shall be kept constant with a tolerance of ± 2 %.

8.2 Resistance to hot objects

The insulation shall be capable of withstanding hot objects and the effects of a normal amount of weld spatter without being ignited or becoming unsafe.

Conformity shall be checked with a device in accordance with Figure 1.

Dimensions in millimetres



Key

1 18/8 chrome-nickel steel rod

2 COUPLING DEVICE

θ test temperature

Figure 1 – Device for testing the resistance to hot objects

An electric current (of approximately 25 A) is passed through the 18/8 chrome-nickel steel rod until a steady-state temperature θ of $300\ ^{+5}_{0}$ °C is reached. During the test, the temperature of the heated rod shall be maintained. This temperature will be measured by a contact thermometer or thermocouple.

The heated rod in a horizontal position is then applied for 2 min to the insulation at the weakest point (for example, minimum insulation thickness and closest distance to live parts). The heated rod shall not penetrate through the insulation and contact live parts.

An attempt is made to ignite any gases which can be emitted in the region of the contact point by means of an electric spark or small flame. If the gases are flammable, the burning shall stop as soon as the heated rod is removed.

9 Mechanical requirements

9.1 RETAINING MEANS

A RETAINING MEANS shall be provided to prevent the unintentional separation of the COUPLING DEVICE as a result of a longitudinal pull.

NOTE If possible, indicating marks, for example two lines opposite each other, show by visual inspection that the RETAINING MEANS has functioned.

Conformity shall be checked by manual operation and visual inspection.

9.2 Welding cable entry

The cable entry of a cable coupler shall be designed to prevent damage to the cable insulation causing exposed conductors.

Conformity shall be checked by bending the cable through an angle of 90°. Verify that there are no exposed conductors by visual inspection.

9.3 Penetration of the welding cable insulation

The design of cable couplers shall be such that the insulation of the cables can enter to a depth of at least twice the outer diameter of the welding cable with a minimum of 30 mm.

Conformity shall be checked by measurement with a welding cable of the maximum cross-sectional area as specified by the manufacturer.

9.4 Welding cable connection

The design of the COUPLING DEVICE shall be such that welding cables with a cross-sectional area within the range as specified by the manufacturer can be replaced. The connection shall withstand the mechanical stress of the tensile test without separation.

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

A plug, a connector or a plug connector is fitted in accordance with the manufacturer's instructions with a welding cable of maximum cross-sectional area. The connection is subjected to 10 pulls with a force of 40 N/mm^2 of the cross-sectional area with a maximum of 2 000 N applied to the welding cable. The force of each pull is gradually increased from zero to the specified value in 1 s and maintained for 1 s.

After the test, the conductor shall not have been displaced by more than 2 mm.

This test shall be repeated with a welding cable having the minimum permissible cross-sectional area as specified by the manufacturer.

If more than one method of cable fixing is provided, all methods shall be tested.

9.5 Crush strength

COUPLING DEVICES shall withstand the mechanical stress of the crush test without the insulation being destroyed or the mechanical functioning being impaired.

Conformity shall be checked by the following test, manual operation and visual inspection.

A cable coupler connected and fitted, in accordance with the manufacturer's instructions, with welding cables of maximum cross-sectional area is placed between the parallel plates of a press, the axis of the cable coupler being at a right angle to the direction of the crush force.

The crush force can be slowly raised over a maximum period of 10 s to the full value given in Table 3 . This crush force shall be maintained at the full value for 10 s.

Table 3 – Crush force

Cross-sectional area of welding cable mm^2	**Crush force** N
up to 25	1 200
25 to 50	1 500
above 50	2 000

This test shall be repeated with a welding cable of minimum cross-sectional area as specified by the manufacturer.

9.6 Dimensions

COUPLING DEVICES shall be designed in accordance with dimensions given in Annex A.

10 Marking

The following information shall be legibly and indelibly marked on COUPLING DEVICES designed to be attached to welding cables:

a) name of the manufacturer, distributor, importer or the registered trademark;
b) maximum permissible cross-sectional area of the welding cable;
c) minimum permissible cross-sectional area of the welding cable;
d) rated peak ARC STRIKING VOLTAGE or ARC STABILIZING VOLTAGE if applicable;
e) reference to this document, confirming that the COUPLING DEVICE complies with the requirements.

For COUPLING DEVICES having a maximum permissible cross-sectional area less than or equal to 16 mm^2, the dimensions of which are such that it is not possible to put on all the markings clearly, item c) can be omitted and shown on the packing or in the literature.

COUPLING DEVICES designed to be mounted on a panel shall not be marked.

Conformity shall be checked by reading the marking.

11 Instructions for use

Each COUPLING DEVICE shall be delivered with an instruction sheet which includes the following information:

a) correct coupling and uncoupling of the COUPLING DEVICE;
b) correct connection of the welding cable;
c) choice of welding cable, type and size;
d) relation of permissible current and duty cycle.

Conformity shall be checked by reading the instructions.

Annex A
(normative)

Dimensions

COUPLING DEVICES in accordance with this document shall have the dimensions as specified in Figure A.1, Figure A.2, Figure A.3, Figure A.4, Figure A.5 and in Table A.1.

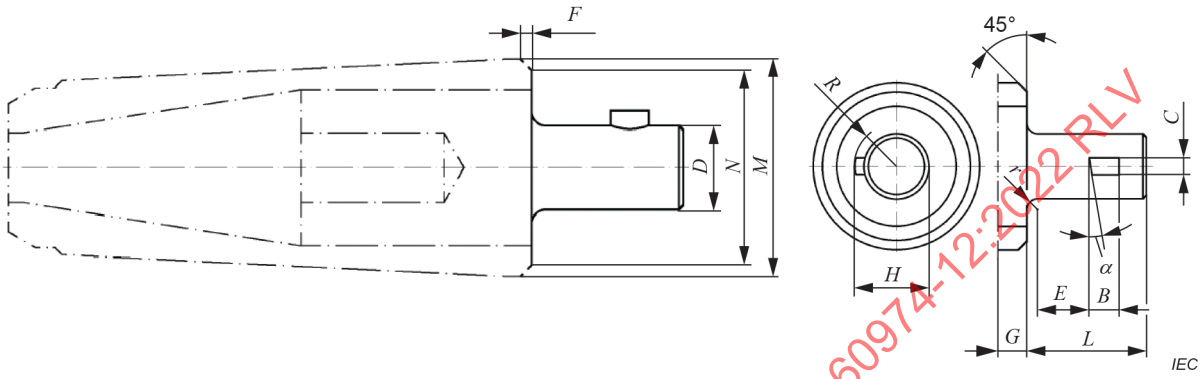


Figure A.1 – Male element

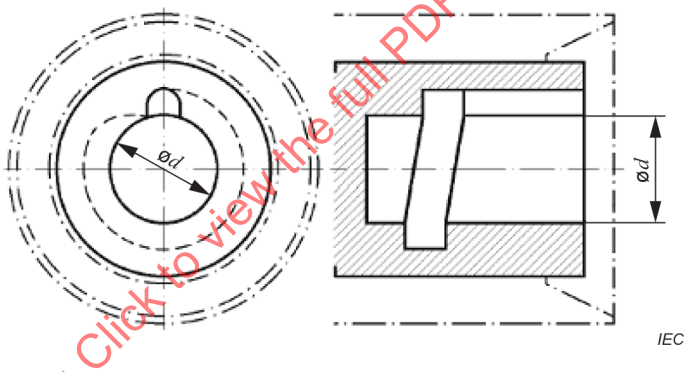


Figure A.2 – Female element

Dimensions and details not specified in Figure A.1 and Figure A.2 and Table A.1 are left to the discretion of the manufacturer.

Table A.1 – Dimensions for Figure A.1, Figure A.2, Figure A.3, Figure A.4, and Figure A.5

Dimension		Dimension in millimetres or degrees		
		Type 1	Type 2	Type 3
α		4	5	1°40'
r		0,4	0,4	0,4
d		$9^{+0,08}_{+0,02}$	$13^{+0,08}_{+0,02}$	$15^{+0,08}_{+0,02}$
R	max.	5,6	8,7	10
N	max.	16	27	30
M	max.	26	40	45
H	max.	10,5	15,47	17,5
G	min.	6,5	7	7
F	min.	2	2,5	6
$E + r$		$4,65^{+0,1}_{0}$	$10,04^{+0,1}_{0}$	$15^{+0,1}_{0}$
D		$9^{-0,01}_{-0,1}$	$13^{-0,01}_{-0,1}$	$15^{-0,01}_{-0,1}$
C	max.	4,5	5,2	6
$C2$	max.	3,6	4,4	-
B	max.	4,5	5,2	6
L	max.	12	20	26

The locking pin can by cylindrical, conical or prismatic and shall not violate the maximum outlines specified in Figure A.3, Figure A.4, and Figure A.5.

NOTE The locking pin shape does not necessarily follow the max outline shape.

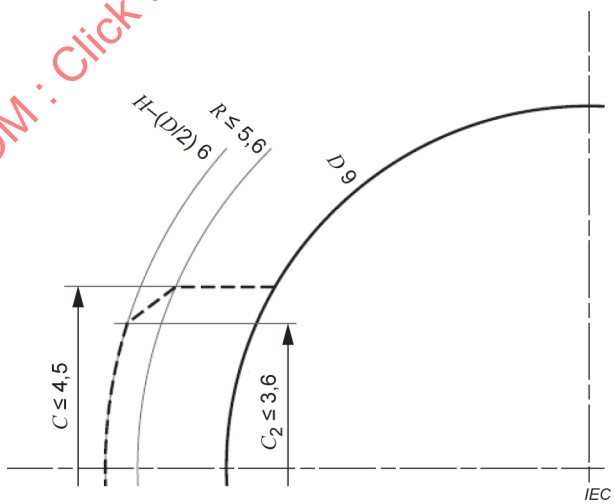


Figure A.3 – Type 1 locking pin maximum outline shape

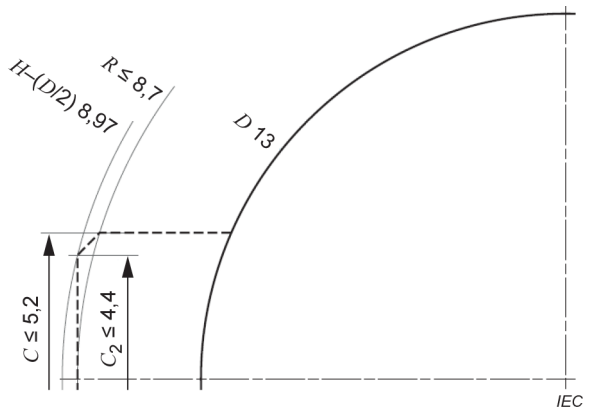


Figure A.4 – Type 2 locking pin maximum outline shape

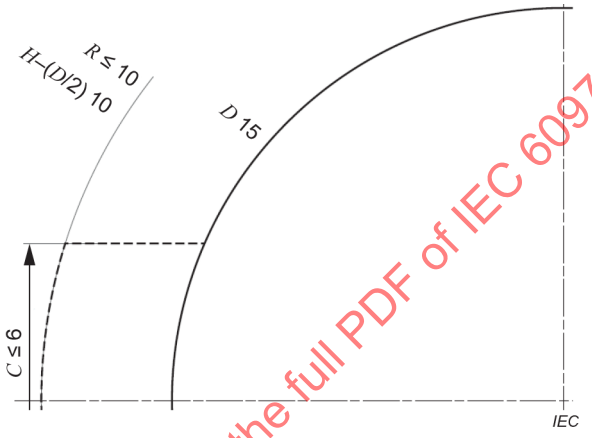


Figure A.5 – Type 3 locking pin maximum outline shape

Bibliography

IEC Guide 116, *Guidelines for safety related risk assessment and risk reduction for low voltage equipment*

EN 50565-1:2014, *Electric cables – Guide to use for cables with a rated voltage not exceeding 450/750 V (U0/U) – Part 1: General guidance*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

_____

MATÉRIEL DE SOUDAGE À L'ARC –

Partie 12: Dispositifs de connexion pour câbles de soudage

AVANT-PROPOS

1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'IEC 60974-12 a été établie par le comité d'études 26 de l'IEC: Soudage électrique. Il s'agit d'une Norme internationale.

Cette quatrième édition annule et remplace la troisième édition parue en 2011. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) mise à jour du Tableau 1 pour inclure le facteur de marche de 100 %;
b) mise à jour de l'Annexe A pour fournir plus de détails.

Le texte du présent document est issu des documents suivants:

Projet	Rapport de vote
26/734/FDIS	26/736/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

Dans le présent document, les caractères d'imprimerie suivants sont utilisés:

– *déclarations de conformité*: *caractères italiques*;
– termes utilisés dans le présent et document définis à l'Article 3: PETITES MAJUSCULES EN CARACTERES ROMAINS.

Une liste de toutes les parties de la série IEC 60974, publiées sous le titre général *Matériel de soudage à l'arc*, se trouve sur le site web de l'IEC.

Le comité a décidé que le contenu du présent document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. A cette date, ce document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

MATÉRIEL DE SOUDAGE À L'ARC –

Partie 12: Dispositifs de connexion pour câbles de soudage

1 Domaine d'application

La présente partie de l'IEC 60974 s'applique aux DISPOSITIFS DE CONNEXION pour câbles utilisés lors du soudage et des techniques connexes conçus pour assurer les opérations de connexion et de déconnexion sans emploi d'outils.

La présente partie de l'IEC 60974 spécifie les exigences de sécurité et de performance pour les DISPOSITIFS DE CONNEXION.

La présente partie de l'IEC 60974 ne s'applique pas aux DISPOSITIFS DE CONNEXION utilisés pour le soudage sous l'eau.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60050-151, *Vocabulaire Electrotechnique International (IEV) – Partie 151: Dispositifs électriques et magnétiques*

IEC 60529, *Degrés de protection procurés par les enveloppes (Code IP)*

IEC 60974-1:2021, *Matériel de soudage à l'arc – Partie 1: Sources de courant de soudage*

3 Termes et définitions

Pour les besoins du présent document, les termes et définitions de l'IEC 60050-151, et de l'IEC 60974-1 ainsi que les suivants s'appliquent.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse http://www.electropedia.org/
- ISO Online browsing platform: disponible à l'adresse http://www.iso.org/obp

3.1
DISPOSITIF DE CONNEXION
dispositif qui permet de relier deux câbles de soudage ou un câble de soudage à un appareil de soudage

3.2
DISPOSITIF DE RETENUE
dispositif mécanique qui maintient le DISPOSITIF DE CONNEXION et qui empêche une déconnexion involontaire, lorsqu'il est correctement raccordé

3.3
TENSION D'AMORÇAGE DE L'ARC
tension superposée sur le circuit de soudage afin d'amorcer l'arc

3.4
TENSION DE STABILISATION DE L'ARC
tension superposée sur la tension d'arc afin de maintenir l'arc

4 Conditions d'environnement

Le DISPOSITIF DE CONNEXION doit être capable de fonctionner lorsque les conditions d'environnement suivantes se produisent:

a) plage de températures de l'air ambiant:
   – pendant le fonctionnement: –10 °C à + 40 °C;
b) humidité relative de l'air: jusqu'à 90 % à 20 °C.

5 Essais

5.1 Conditions d'essais

Tous les essais de type doivent être effectués sur le même DISPOSITIF DE CONNEXION neuf et totalement assemblé.

Tous les essais de type doivent être effectués à une température de l'air ambiant comprise entre 10 °C et 40 °C.

5.2 Instruments de mesure

Spécifiés en 5.2 de l'IEC 60974-1:2021.

5.3 Ordre des essais

Les essais de type indiqués ci-après doivent être effectués dans l'ordre suivant:

a) examen visuel général;
b) échauffement, voir 8.1;
c) résistance à l'écrasement, voir 9.5;
d) résistance d'isolement, voir 7.2;
e) rigidité diélectrique, voir 7.3.

Les autres essais de type prévus par le présent document qui ne sont pas mentionnés ci-dessus peuvent être effectués dans n'importe quel ordre, selon convenance.

6 Désignation

Les DISPOSITIFS DE CONNEXION doivent être désignés par la plage de la section du câble de soudage prévu pour être connecté. Le courant d'essai est indiqué dans le Tableau 1 et fondé sur la section maximale. Le DISPOSITIF DE CONNEXION pour le soudage doit accepter la section minimale donnée dans le Tableau 1. Il est possible qu'une section minimale réduite soit spécifiée afin d'élargir la plage pour le DISPOSITIF DE CONNEXION.

NOTE Le courant admissible des câbles de soudage est indiqué dans le Tableau D.4 de l'EN 50565-1:2014. Le courant admissible pour un fonctionnement au facteur de marche de 60 % correspond à 25 C dans ce tableau.

Tableau 1 – Rapport entre le courant d'essai du DISPOSITIF DE CONNEXION et la section des câbles de soudage

Plage de la section mm²	Courant d'essai DU DISPOSITIF DE CONNEXION au facteur de marche de 60 % A
1 à 6	80
6 à 10	125
10 à 16	150
16 à 25	200
25 à 35	250
35 à 50	300
50 à 70	400
70 à 95	500
95 à 120	600
NOTE Le courant d'essai est défini afin que le DISPOSITIF DE CONNEXION résiste au courant assigné du câble de soudage.	

La conformité doit être vérifiée par mesurage.

7 Protection contre les chocs électriques

7.1 Caractéristiques assignées de tension

Les DISPOSITIFS DE CONNEXION doivent être assignés selon le procédé indiqué dans le Tableau 2 et, le cas échéant, selon la TENSION D'AMORÇAGE DE L'ARC ou la TENSION DE STABILISATION DE L'ARC.

Tableau 2 – Caractéristiques assignées de tension pour DISPOSITIFS DE CONNEXION

Procédé	Caractéristiques assignées de tension V crête	Résistance d'isolement MΩ	Rigidité diélectrique V eff	Degré de protection selon l'IEC 60529
Tous procédés excepté le coupage plasma	113	2,5	1 000	IP 3X
Coupage plasma	500	2,5	2 100	IP 3X

7.2 Résistance d'isolement

La résistance d'isolement d'un DISPOSITIF DE CONNEXION neuf ne doit pas être inférieure à 2,5 MΩ après le traitement d'humidification.

La conformité doit être vérifiée par l'essai suivant.

a) Traitement d'humidification

Une enceinte humide est maintenue à une température t comprise entre 20 °C et 30 °C avec une humidité relative comprise entre 91 % et 95 %.

Le DISPOSITIF DE CONNEXION non équipé de câbles est porté à une température comprise entre t et t + 4 K puis placé dans l'enceinte humide pendant 48 h.