

© Copyright SEK. Reproduction in any form without permission is prohibited.

Bågsvetsutrustning – Del 6: Strömkällor med begränsad belastningsförmåga

*Arc welding equipment –
Part 6: Limited duty equipment*

Som svensk standard gäller europastandarden EN 60974-6:2016. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60974-6:2016.

Nationellt förord

Europastandarden EN 60974-6:2016

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60974-6, Third edition, 2015 - Arc welding equipment - Part 6: Limited duty equipment**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60974-6, utgåva 2, 2011, gäller ej fr o m 2018-10-27.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English Version

**Arc welding equipment - Part 6: Limited duty equipment
(IEC 60974-6:2015)**

Matériel de soudage à l'arc - Partie 6: Matériel à service
limité
(IEC 60974-6:2015)

Lichtbogenschweißeinrichtungen - Teil 6:
Schweißstromquellen mit begrenzter Einschaltdauer
(IEC 60974-6:2015)

This European Standard was approved by CENELEC on 2015-10-27. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 26/572/FDIS, future edition 3 of IEC 60974-6, prepared by IEC/TC 26 "Electric welding" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60974-6:2016.

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) 2016-07-27
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-10-27

This document supersedes EN 60974-6:2011.

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).

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

Endorsement notice

The text of the International Standard IEC 60974-6:2015 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60085	NOTE	Harmonized as EN 60085.
IEC 60127-1	NOTE	Harmonized as EN 60127-1.
IEC 60269-1	NOTE	Harmonized as EN 60269-1.
IEC 60974	NOTE	Harmonized in EN 60974 series.
IEC 61558-1:2005	NOTE	Harmonized as EN 61558-1:2005 (not modified).

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 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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 60974-5	2013	Arc welding equipment - Part 5: Wire feeders	EN 60974-5	2013
IEC 60974-7	2013	Arc welding equipment - Part 7: Torches	EN 60974-7	2013
IEC 60974-10	-	Arc welding equipment - Part 10: Electromagnetic compatibility (EMC) requirements	EN 60974-10	-
IEC 60974-11	-	Arc welding equipment - Part 11: Electrode holders	EN 60974-11	-
IEC 61032	1997	Protection of persons and equipment by enclosures - Probes for verification	EN 61032	1998
ISO 2503	-	Gas welding equipment - Pressure regulators and pressure regulators with flow-metering devices for gas cylinders used in welding, cutting and allied processes up to 300 bar (30 MPa)	EN ISO 2503	-

CONTENTS

FOREWORD	6
1 Scope	8
2 Normative references	8
3 Terms and definitions	9
4 Environmental conditions	10
5 Tests	10
5.1 Test conditions	10
5.2 Measuring instruments	10
5.3 Conformity of components	10
5.4 Type tests	10
5.5 Routine tests	11
6 Protection against electric shock	11
6.1 Insulation	11
6.1.1 General	11
6.1.2 Clearances	11
6.1.3 Creepage distances	11
6.1.4 Insulation resistance	12
6.1.5 Dielectric strength	12
6.2 Protection against electric shock in normal service (direct contact)	12
6.2.1 Protection provided by the enclosure	12
6.2.2 Capacitors	12
6.2.3 Automatic discharge of supply circuit capacitors	13
6.3 Protection against electric shock in case of a fault condition (indirect contact)	13
6.3.1 Protective provisions	13
6.3.2 Isolation between windings of the supply circuit and the welding circuit	13
6.3.3 Internal conductors and connections	13
6.3.4 Additional requirements for plasma cutting systems	13
6.3.5 Movable coils and cores	13
6.3.6 Touch current in fault condition	13
7 Thermal requirements	15
7.1 Devices for thermal protection and thermal control	15
7.2 Heating test	15
7.2.1 Test conditions	15
7.2.2 Tolerances of the test parameters	15
7.2.3 Rated maximum welding current	15
7.2.4 Calculation	16
7.3 Temperature measurement	16
7.3.1 Measurement condition	16
7.3.2 Surface temperature sensor	16
7.3.3 Resistance	16
7.3.4 Embedded temperature sensor	16
7.3.5 Determination of the ambient air temperature	16
7.3.6 Recording of temperatures	17
7.4 Limits of temperature	17
7.4.1 Windings, commutators and slip-rings	17

7.4.2	External surfaces	17
7.4.3	Other components	17
7.5	Loading test	17
7.6	Commutators and slip-rings	18
8	Thermal control device	18
8.1	Construction	18
8.2	Location	18
8.3	Operation	18
8.4	Resetting	18
8.5	Operating capacity	19
8.6	Indication	19
9	Thermal protection	19
9.1	Construction	19
9.2	Location	19
9.3	Operation	19
10	Abnormal operation	20
10.1	General requirements	20
10.2	Stalled fan test	20
10.3	Short circuit test	20
11	Connection to the input supply network	21
11.1	Input supply	21
11.1.1	Supply voltage	21
11.1.2	Supply current	21
11.1.3	Engine driven welding power source	21
11.2	Multi supply voltage	21
11.3	Means of connection to the supply circuit	21
11.4	Supply circuit terminals	21
11.5	Cable anchorage	22
11.6	Inlet openings	22
11.7	Supply circuit on/off switching device	22
11.8	Supply cables	22
11.9	Supply coupling device (attachment plug)	22
12	Output	22
12.1	Rated no-load voltage	22
12.1.1	Rated no-load voltage for arc welding power source	22
12.1.2	Rated no-load voltage for plasma cutting power source	23
12.1.3	Additional requirements	23
12.1.4	Measuring circuit	24
12.2	Type test values of the conventional load voltage	25
12.2.1	Manual metal arc welding with covered electrodes	25
12.2.2	Tungsten inert gas arc welding	25
12.2.3	Metal inert/active gas and flux cored arc welding	25
12.2.4	Plasma cutting	25
12.2.5	Additional requirements	25
12.3	Mechanical switching devices used to adjust output	26
12.4	Welding circuit connections	26
12.4.1	Protection against unintentional contact	26
12.4.2	Location of coupling devices	26

12.4.3	Outlet openings	26
12.4.4	Marking	26
12.4.5	Connections for plasma cutting torches	26
12.5	Power supply to external devices	26
12.6	Auxiliary power output.....	26
12.7	Welding cables	26
13	Control circuits	26
14	Hazard reducing device	26
15	Mechanical provisions	27
15.1	General requirements	27
15.2	Enclosure	27
15.2.1	Enclosure materials	27
15.2.2	Enclosure strength.....	27
15.3	Handling means	27
15.4	Drop withstand.....	27
15.5	Tilting stability.....	27
16	Auxiliaries.....	27
16.1	General.....	27
16.2	Wire feeder	27
16.2.1	General	27
16.2.2	Test conditions	27
16.2.3	Thermal requirements.....	28
16.2.4	Protection against unintentional contact.....	28
16.3	Torch	28
16.3.1	General	28
16.3.2	Test conditions	28
16.3.3	Thermal requirements.....	28
16.4	Electrode holder.....	28
16.5	Pressure regulator	28
17	Rating plate	28
17.1	General requirements	28
17.2	Description	28
17.3	Contents	29
17.4	Tolerances.....	31
18	Adjustment of the output.....	32
19	Instructions and markings.....	32
19.1	Instructions	32
19.1.1	General	32
19.1.2	Instruction manual	32
19.1.3	Safety instructions	32
19.2	Markings	33
Annex A (informative)	Test probes	35
Annex B (informative)	Examples of rating plates	36
Annex C (informative)	Symbols-only precautionary label.....	37
Bibliography.....		38

Figure 1 – Measurement of touch current in fault condition	14
--	----

Figure 2 – Measuring network for weighted touch current	14
Figure 3 – Measurement of r.m.s values	24
Figure 4 – Measurement of peak values.....	25
Figure 5 – Principle of the rating plate	29
Figure A.1 – Test probe 12 of IEC 61032	35
Figure A.2 – Test probe 13 of IEC 61032	35
Figure B.1 – Rating plate	36
Figure C.1 – Example of precautionary label for engine driven manual metal arc welding power source	37
Table 1 – Temperature limits according to the class of insulation.....	17
Table 2 – Maximum temperature limits.....	20
Table 3 – Summary of rated no-load voltages	24
Table 4 – Hazard reducing device requirements for plasma cutting power source	27

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ARC WELDING EQUIPMENT –**Part 6: Limited duty equipment****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.

International Standard IEC 60974-6 has been prepared by IEC technical committee 26: Electric welding.

This third edition cancels and replaces the second edition published in 2010. It constitutes a technical revision.

The main significant technical changes with respect to the previous edition are the following:

- modified measurement conditions (see 7.3.1);
- improved values for temperature limits according to the class of insulation (see Table 1);
- improved maximum temperature limits (see Table 2);
- deleted overload test.

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

FDIS	Report on voting
26/572/FDIS	26/581/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This standard is to be used in conjunction with IEC 60974-1:2012.

In this standard, the following print types are used:

– *conformity statements: in italic type.*

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

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

ARC WELDING EQUIPMENT –

Part 6: Limited duty equipment

1 Scope

This part of IEC 60974 specifies safety and performance requirements applicable to limited duty arc welding and cutting power sources and auxiliaries designed for use by laymen. Electrically powered equipment is intended to be connected to the single phase public low-voltage supply system. Engine driven power sources cannot exceed output power of 7,5 kVA.

NOTE 1 This equipment is typically used by non-professionals in residential areas.

This part of IEC 60974 is not applicable to arc welding and cutting power sources that require for operation:

- arc striking and stabilizing devices;
- liquid cooling systems;
- gas consoles;
- three-phase input supply;

and which are intended for industrial and professional use only.

This part of IEC 60974 is not applicable to arc welding and cutting power sources and ancillary equipment used in:

- mechanically guided applications;
- submerged arc welding process;
- plasma gouging process;
- plasma welding process;

that are covered by other parts of IEC 60974.

NOTE 2 Power sources, wire feeders, torches and electrode holders designed for industrial and professional use are respectively covered by IEC 60974-1, IEC 60974-5, IEC 60974-7 and IEC 60974-11.

NOTE 3 This part of IEC 60974 does not specify electromagnetic compatibility (EMC) requirements that are given in IEC 60974-10.

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

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

IEC 60974-5:2013, *Arc welding equipment – Part 5: Wire feeders*

IEC 60974-7:2013, *Arc welding equipment – Part 7: Torches*

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

IEC 60974-11, *Arc welding equipment – Part 11: Electrode holders*

IEC 61032:1997, *Protection of persons and equipment by enclosure – Probes for verification*

ISO 2503, *Gas welding equipment – Pressure regulators and pressure regulators with flow-metering devices for gas cylinders used in welding, cutting and allied processes up to 300 bar (30 MPa)*