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Edition 3.0 2021-04
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Arc welding equipment –
Part 8: Gas consoles for welding and plasma cutting systems

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CONTENTS

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ARC WELDING EQUIPMENT –

Part 8: Gas consoles for welding and plasma cutting systems

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60974-8:2009. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60974-8 has been prepared by IEC technical committee 26: Electric welding.

This third edition cancels and replaces the second edition, published in 2009. This edition constitutes a technical revision.

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

- changes induced by the publication of IEC 60974-1:2017;
- requirements for the rating plate as in IEC 60974-1:2017, Clause 15;
- requirements for the instructions in 13.2.

This part of IEC 60974 is to be used in conjunction with IEC 60974-1.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
26/719/FDIS	26/723/RVD

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

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

In this standard, the following print types are used:

– conformity statements: in *italic type*.
– terms defined in Clause 3: in SMALL ROMAN CAPITALS.

A list of all parts of 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 document will remain unchanged until the stability date indicated on the IEC website under "http://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- withdrawn,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 publication 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.

INTRODUCTION

If the console is designed to operate with explosive gases, the manufacturer should perform an assessment for applicability of local legislation for explosive atmospheres (example: ATEX regulation).

ARC WELDING EQUIPMENT –

Part 8: Gas consoles for welding and plasma cutting systems

1 Scope

This part of IEC 60974 specifies safety and performance requirements for GAS CONSOLES intended to be used with combustible gases or oxygen. These GAS CONSOLES are designed to supply gases for use in arc welding, plasma cutting, gouging and allied processes in non-explosive atmospheres.

The GAS CONSOLE can be external or internal to the power source enclosure. In the latter case, ~~this standard also applies to~~ the power source shall meet the requirements of both IEC 60974-1 and this document.

NOTE See Annex A for mechanised plasma system diagram.

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 60050-151:2001, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices*
IEC 60050-151:2001/AMD1:2013
IEC 60050-151:2001/AMD2:2014
IEC 60050-151:2001/AMD3:2019
IEC 60050-151:2001/AMD4:2020

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60664-1, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60974-1:~~2005~~2017, *Arc welding equipment – Part 1: Welding power sources*
IEC 60974-1:2017/AMD1:2019

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

ISO 10225, *Gas welding equipment — Marking for equipment used for gas welding, cutting and allied processes*

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
gas console
device for gas-flow routing, mixing or both that contains electrical apparatus in a single or multiple enclosure, or open structure

3.2
lower explosion limit
LEL
concentration of flammable gas or vapour in air, below which the gas atmosphere is not explosive

~~[IEV 426-02-09, modified] [1]~~[1]

3.3
lower flammability limit
LFL
minimum concentration of combustible gas in a mixture where a combustion can be ignited by an ignition source

3.4
upper explosion limit
UEL
concentration of flammable gas or vapour in air, above which the gas atmosphere is not explosive

~~[IEV 426-02-10, modified]~~

3.5
upper flammability limit
UFL
maximum concentration of combustible gas in a mixture where a combustion can be ignited by an ignition source

3.6
external gas console
GAS CONSOLE not incorporated in a power source

3.7
internal gas console
GAS CONSOLE incorporated in a power source

3.8
single-fault condition
condition in which one means for protection against hazard is defective

Note 1 to entry: If a SINGLE-FAULT CONDITION results unavoidably in another SINGLE-FAULT CONDITION, the two failures are considered as one SINGLE-FAULT CONDITION.

~~[IEC 61010-1, definition 3.5.11, modified] [7]~~

_____

~~1 Figures in square brackets refer to the bibliography.~~

3.9
hazardous-live-part
live part which, under certain conditions, can give a harmful electric shock

[SOURCE: IEC 60050-195:1998, 195-06-05]

3.10
hazardous part
part that is hazardous to approach or touch

4 Environmental conditions

As specified in Clause 4 of IEC 60974-1:2017.

5 Tests

5.1 Test conditions

As specified in 5.1 of IEC 60974-1:2017.

5.2 Measuring instruments

As specified in 5.2 of IEC 60974-1:2017.

5.3 Conformity of components

As specified in 5.3 of IEC 60974-1:2017.

5.4 Type tests

As specified in 5.4 of IEC 60974-1:2017.

The other tests included in this document may be carried out in any convenient sequence.

5.5 Routine tests

5.5.1 EXTERNAL GAS CONSOLE

All routine tests shall be carried out on each EXTERNAL GAS CONSOLE in the following sequence:

a) general visual inspection, see 3.1.7 of IEC 60974-1:2017;
b) continuity of protective circuit, see 10.~~4.2~~5.3 of IEC 60974-1:2017;
c) dielectric strength, see 6.1.5 of IEC 60974-1:2017;
d) leak test, see 10.3;
e) general visual inspection, see 3.1.7 of IEC 60974-1:2017.

5.5.2 INTERNAL GAS CONSOLE

All routine tests, as specified in 5.5 of IEC 60974-1:2017, shall be carried out on each INTERNAL GAS CONSOLE, with the following addition:

a) leak test, see 10.3.

6 Protection against electric shock

6.1 Insulation

6.1.1 General

As specified in 6.1.1 of IEC 60974-1:2017, with the following exception:

~~Printed circuit boards shall be enclosed, coated, or encapsulated.~~

The micro-environment of printed circuit boards shall be improved to pollution degree 2 or better (by means such as filtering, coating, potting, moulding) so that only non-conductive pollution or occasional temporary conductivity caused by condensation occurs in accordance with IEC 60664-1.

6.1.2 Clearances

As specified in 6.1.2 of IEC 60974-1:2017.

6.1.3 Creepage distances

As specified in 6.1.3 of IEC 60974-1:2017.

6.1.4 Insulation resistance

As specified in 6.1.4 of IEC 60974-1:2017.

6.1.5 Dielectric strength

As specified in 6.1.5 of IEC 60974-1:2017.

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

6.2.1 Protection provided by the enclosure

The minimum degree of protection for GAS CONSOLES shall be IP21S in accordance with IEC 60529.

Conformity shall be checked by:

a) applying the articulated finger and ball, as specified in IEC 60529, to any openings and ensuring it does not contact any hazardous ~~parts~~ live part; and

b) verifying that immediately after the water test, as specified in IEC 60529, the unit satisfies insulation resistance and the dielectric strength tests and is able to operate.

No power is applied to the unit while performing these tests.

6.2.2 Capacitors

As specified in 6.2.2 of IEC 60974-1:2017.

6.2.3 Automatic discharge of supply circuit capacitors

As specified in 6.2.3 of IEC 60974-1:2017.

6.2.4 Isolation of the welding circuit

As specified in 6.2.4 of IEC 60974-1:2017.

6.2.5 Welding circuit touch current

As specified in 6.2.5 of IEC 60974-1:2017.

6.2.6 Touch current in normal condition

As specified in 6.2.6 of IEC 60974-1:2017.

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

As specified in 6.3 of IEC 60974-1:2017.

7 Thermal requirements

7.1 Heating test

As specified in 7.1 of IEC 60974-1:2017.

~~For an external gas console, only the relevant tests are performed.~~

~~**7.2 Maximum temperature**~~

~~The temperature at any point shall not exceed the ignition temperature of any combustible gas intended to be used in the gas console.~~

~~*Conformity shall be checked by operating the gas console as specified by the manufacturer*~~

~~*a) with the combinations of gas(es) and flow rates which creates the worst-case condition, as specified by the manufacturer;*~~

~~*b) with the cooling liquid as specified by the manufacturer.*~~

7.2 Temperature measurement

As specified in 7.2 of IEC 60974-1:2017.

7.3 Limits of temperature rise

As specified in 7.3 of IEC 60974-1:2017.

Additionally, the temperature of surfaces exposed to combustible gases shall be at least 20 % cooler than the ignition temperature of any combustible gas intended to be used in the GAS CONSOLE.

Conformity shall be checked by operating the GAS CONSOLE at the maximum specified ambient temperature and system duty cycle, while monitoring the inside of the gas console with an IR camera for temperatures exceeding the 20 % margin of the ignition temperature of any combustible gas intended to be used in the GAS CONSOLE.

a) with the combinations of gas(es) and flow rates which creates the worst-case condition, as specified by the manufacturer;

b) with the cooling liquid as specified by the manufacturer.

8 Connections for plasma cutting torches

As specified in 11.4.6 of IEC 60974-1:2017, where the torch connects to the GAS CONSOLE.

9 Mechanical ~~requirements~~ provisions

9.1 General

As specified in Clause 14 of IEC 60974-1:2017, with the following additions.

9.2 Protection against fire or explosion

The GAS CONSOLE shall be designed to prevent fire or explosion under normal operating conditions and under a SINGLE-FAULT CONDITION (for example, defective valve, hose, etc.).

Where a GAS CONSOLE uses a combustible gas, any circuit, subassembly, or component shall not be capable of creating temperatures or a spark with sufficient energy to cause an ignition.

~~Where A GAS CONSOLE uses a combustible gas in a mixture, the mixture shall not be included within flammability limit that is defined by LFL and UFL.~~

A GAS CONSOLE using combustible gas in a mixture shall not allow the concentration of mixture to be between the LFL and UFL.

Conformity shall be checked by:

a) design evaluation and calculations of the circuits, subassembly, or component verification;

or

b) applying a fault (for example, open circuit, short circuit, and/or restriction of movement) to the circuits, subassembly, or component until an event occurs (for example, a spark which does not cause ignition, fuse opens, unit shuts down, etc.) or a steady-state temperature is achieved.

9.3 Gas line purging

The GAS CONSOLE shall have a means to purge gas lines when changing to a different type of gas (for example, oxidizing or oxygen containing to combustible) to reduce the risk of fire or explosion. In some cases, a small amount of combustible gas or oxygen may accumulate in the torch. This volume shall be small enough so that no risk can result.

The purging shall occur after each change in gas routing or when the previous gas routing is unknown.

NOTE 1 A means of accomplishing this can be by purging the lines with a sufficient volume of an inert gas.

NOTE 2 When a risk of fire or explosion exists in the gas lines due to changing gas, the purging can be performed with the following pressure cycle:

a) reduce the pressure of the GAS CONSOLE circuit to atmosphere pressure;

b) purge the GAS CONSOLE circuit with the purging gas;

c) increase the pressure to the maximum pressure of purging gas;

d) reduce the pressure of the GAS CONSOLE circuit to atmosphere pressure.

Conformity shall be checked by risk analysis and the following test.

The gas lines, when installed with all devices (valves, fittings, etc.) shall be filled with a combustible gas and measured with a gas detector. Immediately after, the gas lines shall be purged according to the instruction manual. Once purging has been completed, the contents of the gas lines shall be measured with the gas detector to ensure that the lines have been purged to a level ~~lower than~~ below the lower flammability level (LFL) of the gas. If more than one combustible gas is used, the test shall be repeated for each combustible gas.

9.4 Enclosure

9.4.1 Design requirements

The GAS CONSOLE (external or internal) shall be designed to withstand or prevent an explosion. This shall be accomplished by complying with the requirements in 9.4.2, 9.4.3, 9.4.4, or 9.4.5 ~~at least one of the requirements in 9.3.2 through 9.3.4~~. All tests described below are dangerous, and shall be performed by a person with sufficient technical knowledge.

~~NOTE All tests described below are dangerous, and it is recommended that they are performed by qualified personnel.~~

9.4.2 Enclosure purging

Purging means typically include positive pressure of an inert gas and forced ventilation (e.g. use of a non-arcing fan). Any automatic means to purge the GAS CONSOLE enclosure of combustible gases shall be activated before other electrical devices are energized.

Where a fan or other device is used for purging, a malfunction shall be indicated and the system shall be prevented from continuing to operate.

After purging, the level of combustible gas shall not exceed the lower explosion level (LEL).

Conformity shall be checked in a draught-free environment by a) or b) below.

a) Simulate a continuous gas leak inside the enclosure equal to the maximum flow rate and pressure as specified by the manufacturer. Monitor and adjust the gas in the enclosure until saturation or stabilization occurs. Activate the purging device(s) and monitor the gas to ensure it reaches the LEL before ~~a potential ignition source is~~ any electrical devices are energized. Repeat for each type of combustible gas used.

b) Place a simulated arcing device inside the purged enclosure. Monitor and adjust the gas in the enclosure until saturation or stabilization occurs. Operate all purging means and initiate start-up sequence. Energize the arcing device to simulate the ~~electronics~~ electrical devices start-up, and operate continuously ensuring that no ignition occurs. Repeat for each type of combustible gas used.

NOTE ~~1~~ A safe level of gas is 50 % of the LEL.

~~NOTE 2 The leak rate needs to be considered when performing these tests.~~

9.4.3 Safe design of GAS CONSOLE

9.4.3.1 Prevention of ignition

The GAS CONSOLE shall be designed to prevent an ignition caused by a gas leak in the enclosure.

Conformity shall be checked by completing the following test.

a) Place the energized equipment, i.e. the EXTERNAL GAS CONSOLE or the power source with INTERNAL GAS CONSOLE, in a bag (or similar).

b) Simulate a gas leak inside the equipment to create an internal explosive atmosphere.

c) Monitor the mixture until it is halfway between the LEL and the UEL of the gas.

d) Operate the GAS CONSOLE for a period of at least 1 h, during which all components capable of causing ignition are cycled at least 100 times.

e) Verify that no ignition occurred during the operating period.

~~f) Ignite the bag (or similar) to confirm that a flammable mixture was present.~~

9.4.3.2 Integrity of the enclosure

The enclosure, i.e the EXTERNAL GAS CONSOLE or the power source with INTERNAL GAS CONSOLE, shall withstand an explosion without degradation of the protective continuity circuit.

Conformity shall be checked by completing the following test.

a) Place the non-energized equipment, i.e. the EXTERNAL GAS CONSOLE or the power source with INTERNAL GAS CONSOLE, in a bag (or similar).

b) Simulate a gas leak inside the equipment to create an internal explosive atmosphere.

c) Monitor the mixture until it is halfway between the LEL and the UEL of the gas.

d) Ignite the flammable mixture using an arcing device installed in the equipment to create an explosion.

e) Verify that there was no flying debris.

f) Verify there is no contact with ~~live~~ hazardous parts using the jointed test finger specified in IEC 60529.

g) Verify the continuity of the protective circuit by visual inspection and measurement.

9.4.4 Open structure

An open-structure GAS CONSOLE designed with no enclosure or a partial enclosure that cannot accumulate a combustible mixture and cause an explosion shall be considered safe.

Conformity shall be checked by design review.

9.4.5 Solid filled enclosure

A GAS CONSOLE designed with an enclosure that does not contain any empty volume that can accumulate oxygen or a combustible mixture shall be considered safe.

Conformity shall be checked by design review.

9.5 EXTERNAL GAS CONSOLE

Where combustible gases are used, the EXTERNAL GAS CONSOLE shall only enclose the electric and non-electric apparatus (for example, electromagnetic valves, metering devices, flow meters, control circuits) required to route gases to the torch.

Conformity shall be checked by visual inspection.

9.6 INTERNAL GAS CONSOLE

Where combustible gases are used, the INTERNAL GAS CONSOLE gas lines and gas components shall be separated by a barrier from the power source's ~~live components~~ *hazardous-live-parts* within the same enclosure. GAS CONSOLE control circuits may be located on either side of the barrier.

Conformity shall be checked by visual inspection.

10 Gas lines

10.1 Gas hoses and tubing

Gas hoses and tubing shall be suitable for the application. Gas hoses and tubing shall be rated for the maximum pressure at the maximum rated temperature in accordance with the product ratings.

~~Supply gas hoses shall be properly colour-coded or marked as specified in Table 1. Where gas supply circuit conveys more than one type of gas, gas hoses and tubing need not be marked provided the design prevents misconnections.~~

Supply gas hoses shall be properly colour-coded as specified in Table 1. If the Letter-code is used in the supply gas hose, it shall be comply with ISO 10225.

Table 1 – Colour coding ~~and marking~~

Gas	Colour of cover
Acetylene and other combustible gases (except LPG, MPS, natural gas, ~~red~~ methane)	Red
Oxygen	Blue
Air, nitrogen, argon, CO2	Black
LPG, MPS, natural gas, methane ~~orange~~	Orange
All fuel gases (included in this table) ~~red-orange~~	Red-orange
NOTE 1 The manufacturer should be consulted on the suitability of the hose for use with hydrogen (including the mixture gases containing hydrogen) or propylene. NOTE 2 This table is taken from ISO 3821 and ISO 12170 ~~[8]~~.	

Conformity shall be checked by visual inspection and the test given in 10.3.

10.2 Gas fittings

Supply gas fittings shall not be interchangeable (for example, size, thread type) to avoid mixing fuel gases with inert gases or oxygen/air.

Conformity shall be checked by visual inspection.

10.3 Leak test

Assemblies through which gas flows shall be capable of operating under the rated inlet pressure at the rated operating temperature, without a hazardous leak ~~as specified by the manufacturer~~.

~~*Conformity shall be checked by a test specified by the manufacturer to ensure a safe assembly.*~~

~~NOTE~~ Air or inert gas used for this test should not contain contaminants that could degrade components used with oxygen.

Conformity shall be checked by pressurizing the system to 125 % of the rated pressure using Nitrogen gas (N2) while ensuring that the leakage is less than or equal to 5 sccm at the rated inlet pressure and rated operating temperature for 30 s.

11 Control circuits

~~Control circuits not connected to the welding circuit shall meet the following requirements.~~

~~a) The operating voltage of control circuits shall not exceed 250 V.~~

~~b) A transformer with separate windings shall be used for supplying the control circuits.~~

~~c) Overvoltage protection shall be provided.~~

~~d) Overcurrent protection shall be provided.~~

~~e) Single-fault conditions that may impair safety shall be evaluated.~~

~~f) Transformer secondary, except for SELV, circuits shall be grounded.~~

~~g) Insulation of bundled conductors shall be rated to the highest voltage of any of the conductors.~~

~~h) Software and logic circuits shall not affect safety negatively.~~

~~i) Control circuits that leave the enclosure shall be isolated from the primary circuit by double or reinforced insulation.~~

~~NOTE 1 These requirements are based on IEC 60204-1[2].~~

~~*Conformity shall be checked by measurement or analysis, as appropriate.*~~

~~NOTE 2 Types of control circuits:~~

~~a) control circuits that are internal to the welding/cutting equipment enclosure;~~

~~b) control circuits intended for interface between the power source and peripheral equipment designed by the manufacturer;~~

~~c) control circuits intended for interfacing between the power source and other types of ancillary equipment;~~

~~d) control circuits intended for inside the gas console.~~

As specified in Clause 12 of IEC 60974-1:2017.

12 Rating plate

12.1 EXTERNAL GAS CONSOLE

As specified in Clause 15 of IEC 60974-1:2017, with the following modifications (as applicable):

a) type of gas(es) used;
b) maximum inlet gas pressure;
c) maximum gas flow rating for each gas.

See Annex B for an example of a rating plate layout that may be used for an EXTERNAL GAS CONSOLE.

12.2 INTERNAL GAS CONSOLE

For a GAS CONSOLE within a welding power source enclosure, the rating of the welding power source specified in Clause 15 of IEC 60974-1:2017, shall be used with the following additions:

a) standard reference;
b) type of gas(es) used;
c) maximum inlet gas pressure;
d) maximum gas flow rating for each gas.

13 Instructions and markings

13.1 General

Each GAS CONSOLE shall be delivered with instructions and markings.

13.2 Instructions

As specified in 17.1 of IEC 60974-1:2017, with the following additions (as applicable):

a) information for selection and connection of gas hoses and I/O cables;

~~b) EMC information specific to installation and operation of equipment specified in this standard;~~

b) EMC classification in accordance with IEC 60974-10 (stand-alone cooling systems only);

c) information regarding gas purging (for example, after each change in gas routing);

d) ventilation requirements for installation;

e) gas flow rates and maximum pressures;

f) information regarding the gas source (for example, types of gas and purity);

g) statement that flashback arrestors are required (unless not available for specific gases or required pressures) to prevent fire from propagating back to the gas supply;

h) recommended life and replacement of internal flexible hoses for combustible gas and oxygen;

i) information about contamination of oxygen lines;

~~j) general information specific to installation and operation of equipment specified in this standard (e.g. torch location relative to gas console and its supply).~~

j) how to maintain the gas console, such as recommended cycles for partial and complete test and other operation;

k) precautions to be taken with gas cylinders.

NOTE The torch used in arc welding, plasma cutting and gouging is an obvious source of ignition necessary for its intended function.

Conformity shall be checked by visual inspection.

13.3 Marking

As specified in 17.2 of IEC 60974-1:2017, (as applicable) and with the following addition.

Each gas connection shall be legibly and indelibly marked. The gas connections shall be marked with the maximum pressure and the type(s) of gas(es).

Conformity shall be checked by visual inspection.

Annex A
(informative)

Mechanized plasma system diagram

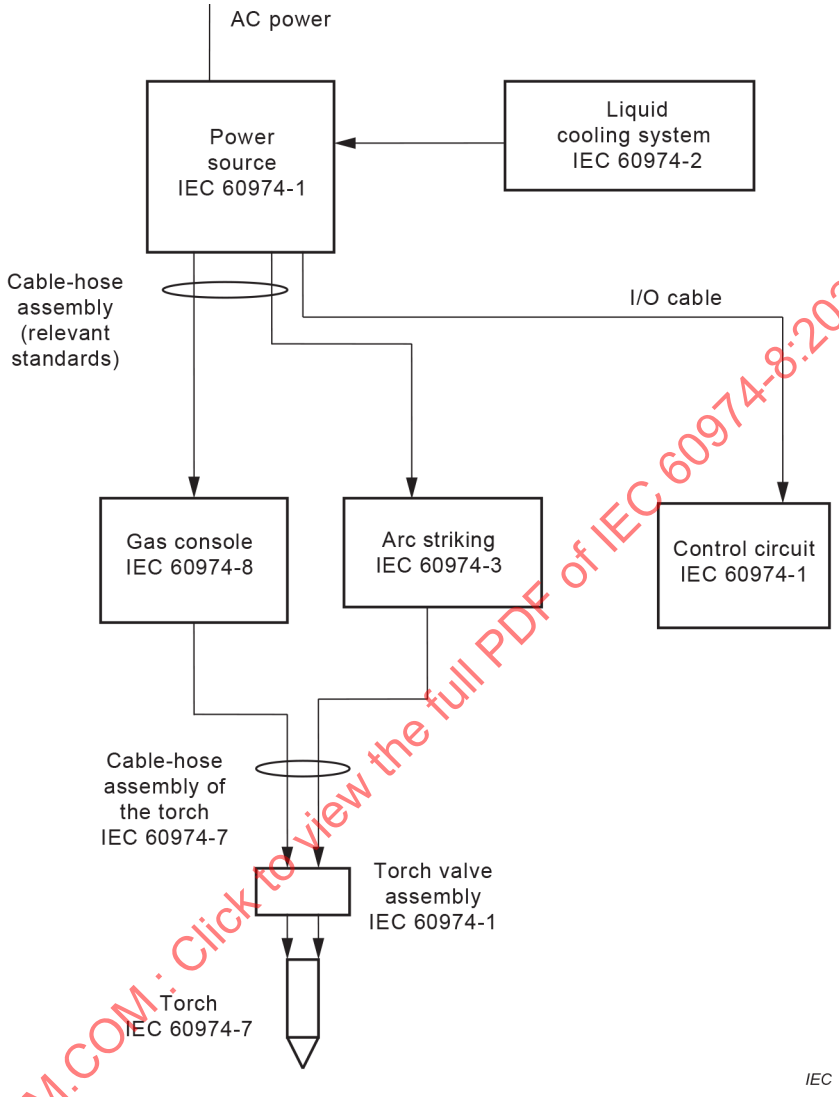
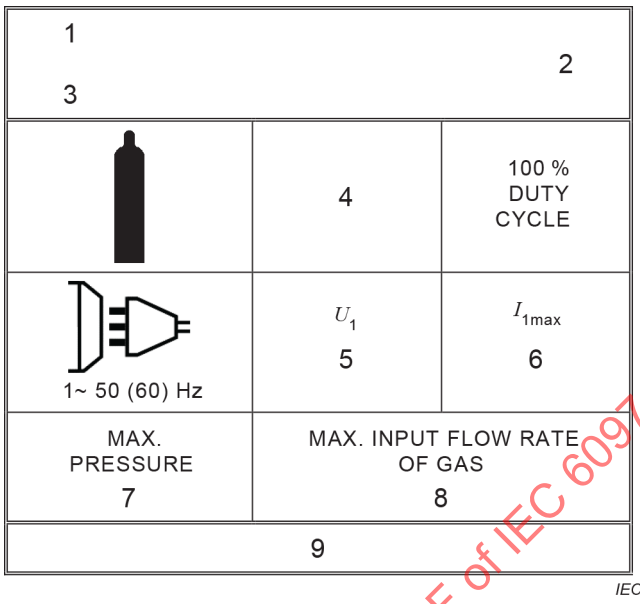


Figure A.1 – Example of a mechanized plasma system

Annex B
(informative)

Example of a rating plate layout



Key

1 Name and address of the manufacturer or distributor or importer and optionally a trademark and the country of origin, if required

2 Reference to this document conforming that the GAS CONSOLE complies with its requirements

3 Type (identification) as given by the manufacturer and traceability of design and manufacturing data, for example, serial number

4 Type of gases used (for example, H_2 or O_2)

5 Rated supply voltage: V

6 Rated maximum supply current: A

7 Maximum inlet gas pressure: MPa (bar)

8 Maximum gas flow rating for each gas: l/min

9 Degree of protection rating: IPXX

Figure B.1 – Principle of a rating plate

Bibliography

IEC 60050-195:1998, *International Electrotechnical Vocabulary (IEV) – Part 195: Earthing and protection against electric shock*
IEC 60050-195:1998/AMD1:2001

IEC 60050-426:~~2008~~2020, *International Electrotechnical Vocabulary (IEV) – Part 426: ~~Equipment for~~ Explosive atmospheres*

IEC 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

~~IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*~~

IEC 60974-2, *Arc welding equipment – Part 2: Liquid cooling systems*

IEC 60974-3, *Arc welding equipment – Part 3: Arc striking and stabilizing devices*

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

IEC 61010-1:~~2001~~2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*
IEC 61010-1:2010/AMD1:*2016*

ISO 3821, *Gas welding equipment – Rubber hoses for welding, cutting and allied processes*

ISO 12170, *Gas welding equipment – Thermoplastic hoses for welding and allied processes*

IEC 60974-8

Edition 3.0 2021-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Arc welding equipment –
Part 8: Gas consoles for welding and plasma cutting systems

Matériel de soudage à l'arc –
Partie 8: Consoles de gaz pour soudage et systèmes de coupage par plasma

IEC 60974-8:2021-04(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

ARC WELDING EQUIPMENT –

Part 8: Gas consoles for welding and plasma cutting systems

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.
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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 60974-8 has been prepared by IEC technical committee 26: Electric welding.

This third edition cancels and replaces the second edition, published in 2009. This edition constitutes a technical revision.

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

- changes induced by the publication of IEC 60974-1:2017;
- requirements for the rating plate as in IEC 60974-1:2017, Clause 15;
- requirements for the instructions in 13.2.

This part of IEC 60974 is to be used in conjunction with IEC 60974-1.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
26/719/FDIS	26/723/RVD

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

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

In this standard, the following print types are used:

– conformity statements: in *italic type*.
– terms defined in Clause 3: in SMALL ROMAN CAPITALS.

A list of all parts of 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 document will remain unchanged until the stability date indicated on the IEC website under "http://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.

INTRODUCTION

If the console is designed to operate with explosive gases, the manufacturer should perform an assessment for applicability of local legislation for explosive atmospheres (example: ATEX regulation).

ARC WELDING EQUIPMENT –

Part 8: Gas consoles for welding and plasma cutting systems

1 Scope

This part of IEC 60974 specifies safety and performance requirements for GAS CONSOLES intended to be used with combustible gases or oxygen. These GAS CONSOLES are designed to supply gases for use in arc welding, plasma cutting, gouging and allied processes in non-explosive atmospheres.

The GAS CONSOLE can be external or internal to the power source enclosure. In the latter case, the power source shall meet the requirements of both IEC 60974-1 and this document.

NOTE See Annex A for mechanised plasma system diagram.

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 60050-151:2001, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices*
IEC 60050-151:2001/AMD1:2013
IEC 60050-151:2001/AMD2:2014
IEC 60050-151:2001/AMD3:2019
IEC 60050-151:2001/AMD4:2020

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60664-1, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60974-1:2017, *Arc welding equipment – Part 1: Welding power sources*
IEC 60974-1:2017/AMD1:2019

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

ISO 10225, *Gas welding equipment — Marking for equipment used for gas welding, cutting and allied processes*

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
gas console
device for gas-flow routing, mixing or both that contains electrical apparatus in a single or multiple enclosure, or open structure

3.2
lower explosion limit
LEL
concentration of flammable gas or vapour in air, below which the gas atmosphere is not explosive

3.3
lower flammability limit
LFL
minimum concentration of combustible gas in a mixture where a combustion can be ignited by an ignition source

3.4
upper explosion limit
UEL
concentration of flammable gas or vapour in air, above which the gas atmosphere is not explosive

3.5
upper flammability limit
UFL
maximum concentration of combustible gas in a mixture where a combustion can be ignited by an ignition source

3.6
external gas console
GAS CONSOLE not incorporated in a power source

3.7
internal gas console
GAS CONSOLE incorporated in a power source

3.8
single-fault condition
condition in which one means for protection against hazard is defective

Note 1 to entry: If a SINGLE-FAULT CONDITION results unavoidably in another SINGLE-FAULT CONDITION, the two failures are considered as one SINGLE-FAULT CONDITION.

3.9
hazardous-live-part
live part which, under certain conditions, can give a harmful electric shock

[SOURCE: IEC 60050-195:1998, 195-06-05]

3.10
hazardous part
part that is hazardous to approach or touch

4 Environmental conditions

As specified in Clause 4 of IEC 60974-1:2017.

5 Tests

5.1 Test conditions

As specified in 5.1 of IEC 60974-1:2017.

5.2 Measuring instruments

As specified in 5.2 of IEC 60974-1:2017.

5.3 Conformity of components

As specified in 5.3 of IEC 60974-1:2017.

5.4 Type tests

As specified in 5.4 of IEC 60974-1:2017.

The other tests included in this document may be carried out in any convenient sequence.

5.5 Routine tests

5.5.1 EXTERNAL GAS CONSOLE

All routine tests shall be carried out on each EXTERNAL GAS CONSOLE in the following sequence:

a) general visual inspection, see 3.1.7 of IEC 60974-1:2017;
b) continuity of protective circuit, see 10.5.3 of IEC 60974-1:2017;
c) dielectric strength, see 6.1.5 of IEC 60974-1:2017;
d) leak test, see 10.3;
e) general visual inspection, see 3.1.7 of IEC 60974-1:2017.

5.5.2 INTERNAL GAS CONSOLE

All routine tests, as specified in 5.5 of IEC 60974-1:2017, shall be carried out on each INTERNAL GAS CONSOLE, with the following addition:

a) leak test, see 10.3.

6 Protection against electric shock

6.1 Insulation

6.1.1 General

As specified in 6.1.1 of IEC 60974-1:2017, with the following exception:

The micro-environment of printed circuit boards shall be improved to pollution degree 2 or better (by means such as filtering, coating, potting, moulding) so that only non-conductive pollution or occasional temporary conductivity caused by condensation occurs in accordance with IEC 60664-1.

6.1.2 Clearances

As specified in 6.1.2 of IEC 60974-1:2017.

6.1.3 Creepage distances

As specified in 6.1.3 of IEC 60974-1:2017.

6.1.4 Insulation resistance

As specified in 6.1.4 of IEC 60974-1:2017.

6.1.5 Dielectric strength

As specified in 6.1.5 of IEC 60974-1:2017.

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

6.2.1 Protection provided by the enclosure

The minimum degree of protection for GAS CONSOLES shall be IP21S in accordance with IEC 60529.

Conformity shall be checked by:

a) applying the articulated finger and ball, as specified in IEC 60529, to any openings and ensuring it does not contact any hazardous live part; and

b) verifying that immediately after the water test, as specified in IEC 60529, the unit satisfies insulation resistance and the dielectric strength tests and is able to operate.

No power is applied to the unit while performing these tests.

6.2.2 Capacitors

As specified in 6.2.2 of IEC 60974-1:2017.

6.2.3 Automatic discharge of supply circuit capacitors

As specified in 6.2.3 of IEC 60974-1:2017.

6.2.4 Isolation of the welding circuit

As specified in 6.2.4 of IEC 60974-1:2017.

6.2.5 Welding circuit touch current

As specified in 6.2.5 of IEC 60974-1:2017.

6.2.6 Touch current in normal condition

As specified in 6.2.6 of IEC 60974-1:2017.

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

As specified in 6.3 of IEC 60974-1:2017.

7 Thermal requirements

7.1 Heating test

As specified in 7.1 of IEC 60974-1:2017.

7.2 Temperature measurement

As specified in 7.2 of IEC 60974-1:2017.

7.3 Limits of temperature rise

As specified in 7.3 of IEC 60974-1:2017.

Additionally, the temperature of surfaces exposed to combustible gases shall be at least 20 % cooler than the ignition temperature of any combustible gas intended to be used in the GAS CONSOLE.

Conformity shall be checked by operating the GAS CONSOLE at the maximum specified ambient temperature and system duty cycle, while monitoring the inside of the gas console with an IR camera for temperatures exceeding the 20 % margin of the ignition temperature of any combustible gas intended to be used in the GAS CONSOLE.

a) with the combinations of gas(es) and flow rates which creates the worst-case condition, as specified by the manufacturer;

b) with the cooling liquid as specified by the manufacturer.

8 Connections for plasma cutting torches

As specified in 11.4.6 of IEC 60974-1:2017, where the torch connects to the GAS CONSOLE.

9 Mechanical provisions

9.1 General

As specified in Clause 14 of IEC 60974-1:2017, with the following additions.

9.2 Protection against fire or explosion

The GAS CONSOLE shall be designed to prevent fire or explosion under normal operating conditions and under a SINGLE-FAULT CONDITION (for example, defective valve, hose, etc.).

Where a GAS CONSOLE uses a combustible gas, any circuit, subassembly, or component shall not be capable of creating temperatures or a spark with sufficient energy to cause an ignition.

A GAS CONSOLE using combustible gas in a mixture shall not allow the concentration of mixture to be between the LFL and UFL.

Conformity shall be checked by:

a) design evaluation and calculations of the circuits, subassembly, or component verification;

or

b) applying a fault (for example, open circuit, short circuit, and/or restriction of movement) to the circuits, subassembly, or component until an event occurs (for example, a spark which does not cause ignition, fuse opens, unit shuts down, etc.) or a steady-state temperature is achieved.

9.3 Gas line purging

The GAS CONSOLE shall have a means to purge gas lines when changing to a different type of gas (for example, oxidizing or oxygen containing to combustible) to reduce the risk of fire or explosion. In some cases, a small amount of combustible gas or oxygen may accumulate in the torch. This volume shall be small enough so that no risk can result.

The purging shall occur after each change in gas routing or when the previous gas routing is unknown.

NOTE 1 A means of accomplishing this can be by purging the lines with a sufficient volume of an inert gas.

NOTE 2 When a risk of fire or explosion exists in the gas lines due to changing gas, the purging can be performed with the following pressure cycle:

a) reduce the pressure of the GAS CONSOLE circuit to atmosphere pressure;

b) purge the GAS CONSOLE circuit with the purging gas;

c) increase the pressure to the maximum pressure of purging gas;

d) reduce the pressure of the GAS CONSOLE circuit to atmosphere pressure.

Conformity shall be checked by risk analysis and the following test.

The gas lines, when installed with all devices (valves, fittings, etc.) shall be filled with a combustible gas and measured with a gas detector. Immediately after, the gas lines shall be purged according to the instruction manual. Once purging has been completed, the contents of the gas lines shall be measured with the gas detector to ensure that the lines have been purged to a level below the lower flammability level (LFL) of the gas. If more than one combustible gas is used, the test shall be repeated for each combustible gas.

9.4 Enclosure

9.4.1 Design requirements

The GAS CONSOLE (external or internal) shall be designed to withstand or prevent an explosion. This shall be accomplished by complying with the requirements in 9.4.2, 9.4.3, 9.4.4, or 9.4.5. All tests described below are dangerous, and shall be performed by a person with sufficient technical knowledge.

9.4.2 Enclosure purging

Purging means typically include positive pressure of an inert gas and forced ventilation (e.g. use of a non-arcing fan). Any automatic means to purge the GAS CONSOLE enclosure of combustible gases shall be activated before other electrical devices are energized.

Where a fan or other device is used for purging, a malfunction shall be indicated and the system shall be prevented from continuing to operate.

After purging, the level of combustible gas shall not exceed the lower explosion level (LEL).

Conformity shall be checked in a draught-free environment by a) or b) below.

a) Simulate a continuous gas leak inside the enclosure equal to the maximum flow rate and pressure as specified by the manufacturer. Monitor and adjust the gas in the enclosure until saturation or stabilization occurs. Activate the purging device(s) and monitor the gas to ensure it reaches the LEL before any electrical devices are energized. Repeat for each type of combustible gas used.

b) Place a simulated arcing device inside the purged enclosure. Monitor and adjust the gas in the enclosure until saturation or stabilization occurs. Operate all purging means and initiate start-up sequence. Energize the arcing device to simulate the electrical devices start-up, and operate continuously ensuring that no ignition occurs. Repeat for each type of combustible gas used.

NOTE A safe level of gas is 50 % of the LEL.

9.4.3 Safe design of GAS CONSOLE

9.4.3.1 Prevention of ignition

The GAS CONSOLE shall be designed to prevent an ignition caused by a gas leak in the enclosure.

Conformity shall be checked by completing the following test.

a) Place the energized equipment, i.e. the EXTERNAL GAS CONSOLE or the power source with INTERNAL GAS CONSOLE, in a bag (or similar).

b) Simulate a gas leak inside the equipment to create an internal explosive atmosphere.

c) Monitor the mixture until it is halfway between the LEL and the UEL of the gas.

d) Operate the GAS CONSOLE for a period of at least 1 h, during which all components capable of causing ignition are cycled at least 100 times.

e) Verify that no ignition occurred during the operating period.

9.4.3.2 Integrity of the enclosure

The enclosure, i.e the EXTERNAL GAS CONSOLE or the power source with INTERNAL GAS CONSOLE, shall withstand an explosion without degradation of the protective continuity circuit.

Conformity shall be checked by completing the following test.

a) Place the non-energized equipment, i.e. the EXTERNAL GAS CONSOLE or the power source with INTERNAL GAS CONSOLE, in a bag (or similar).

b) Simulate a gas leak inside the equipment to create an internal explosive atmosphere.

c) Monitor the mixture until it is halfway between the LEL and the UEL of the gas.

d) Ignite the flammable mixture using an arcing device installed in the equipment to create an explosion.

e) Verify that there was no flying debris.

f) Verify there is no contact with hazardous parts using the jointed test finger specified in IEC 60529.

g) Verify the continuity of the protective circuit by visual inspection and measurement.

9.4.4 Open structure

An open-structure GAS CONSOLE designed with no enclosure or a partial enclosure that cannot accumulate a combustible mixture and cause an explosion shall be considered safe.

Conformity shall be checked by design review.

9.4.5 Solid filled enclosure

A GAS CONSOLE designed with an enclosure that does not contain any empty volume that can accumulate oxygen or a combustible mixture shall be considered safe.

Conformity shall be checked by design review.

9.5 EXTERNAL GAS CONSOLE

Where combustible gases are used, the EXTERNAL GAS CONSOLE shall only enclose the electric and non-electric apparatus (for example, electromagnetic valves, metering devices, flow meters, control circuits) required to route gases to the torch.

Conformity shall be checked by visual inspection.

9.6 INTERNAL GAS CONSOLE

Where combustible gases are used, the INTERNAL GAS CONSOLE gas lines and gas components shall be separated by a barrier from the power source's *hazardous-live-parts* within the same enclosure. GAS CONSOLE control circuits may be located on either side of the barrier.

Conformity shall be checked by visual inspection.

10 Gas lines

10.1 Gas hoses and tubing

Gas hoses and tubing shall be suitable for the application. Gas hoses and tubing shall be rated for the maximum pressure at the maximum rated temperature in accordance with the product ratings.

Supply gas hoses shall be properly colour-coded as specified in Table 1. If the Letter-code is used in the supply gas hose, it shall be comply with ISO 10225.

Table 1 – Colour coding

Gas	Colour of cover
Acetylene and other combustible gases (except LPG, MPS, natural gas, methane)	Red
Oxygen	Blue
Air, nitrogen, argon, CO2	Black
LPG, MPS, natural gas, methane	Orange
All fuel gases (included in this table)	Red-orange
NOTE 1 The manufacturer should be consulted on the suitability of the hose for use with hydrogen (including the mixture gases containing hydrogen) or propylene. NOTE 2 This table is taken from ISO 3821 and ISO 12170.	

Conformity shall be checked by visual inspection and the test given in 10.3.

10.2 Gas fittings

Supply gas fittings shall not be interchangeable (for example, size, thread type) to avoid mixing fuel gases with inert gases or oxygen/air.

Conformity shall be checked by visual inspection.

10.3 Leak test

Assemblies through which gas flows shall be capable of operating under the rated inlet pressure at the rated operating temperature, without a hazardous leak. Air or inert gas used for this test should not contain contaminants that could degrade components used with oxygen.

Conformity shall be checked by pressurizing the system to 125 % of the rated pressure using Nitrogen gas (N2) while ensuring that the leakage is less than or equal to 5 sccm at the rated inlet pressure and rated operating temperature for 30 s.

11 Control circuits

As specified in Clause 12 of IEC 60974-1:2017.

12 Rating plate

12.1 EXTERNAL GAS CONSOLE

As specified in Clause 15 of IEC 60974-1:2017, with the following modifications (as applicable):

a) type of gas(es) used;
b) maximum inlet gas pressure;
c) maximum gas flow rating for each gas.

See Annex B for an example of a rating plate layout that may be used for an EXTERNAL GAS CONSOLE.

12.2 INTERNAL GAS CONSOLE

For a GAS CONSOLE within a welding power source enclosure, the rating of the welding power source specified in Clause 15 of IEC 60974-1:2017, shall be used with the following additions:

a) standard reference;
b) type of gas(es) used;
c) maximum inlet gas pressure;
d) maximum gas flow rating for each gas.

13 Instructions and markings

13.1 General

Each GAS CONSOLE shall be delivered with instructions and markings.

13.2 Instructions

As specified in 17.1 of IEC 60974-1:2017, with the following additions (as applicable):

a) information for selection and connection of gas hoses and I/O cables;
b) EMC classification in accordance with IEC 60974-10 (stand-alone cooling systems only);
c) information regarding gas purging (for example, after each change in gas routing);
d) ventilation requirements for installation;
e) gas flow rates and maximum pressures;
f) information regarding the gas source (for example, types of gas and purity);
g) statement that flashback arrestors are required (unless not available for specific gases or required pressures) to prevent fire from propagating back to the gas supply;
h) recommended life and replacement of internal flexible hoses for combustible gas and oxygen;
i) information about contamination of oxygen lines;

j) how to maintain the gas console, such as recommended cycles for partial and complete test and other operation;

k) precautions to be taken with gas cylinders.

NOTE The torch used in arc welding, plasma cutting and gouging is an obvious source of ignition necessary for its intended function.

Conformity shall be checked by visual inspection.

13.3 Marking

As specified in 17.2 of IEC 60974-1:2017, (as applicable) and with the following addition.

Each gas connection shall be legibly and indelibly marked. The gas connections shall be marked with the maximum pressure and the type(s) of gas(es).

Conformity shall be checked by visual inspection.

Annex A
(informative)

Mechanized plasma system diagram

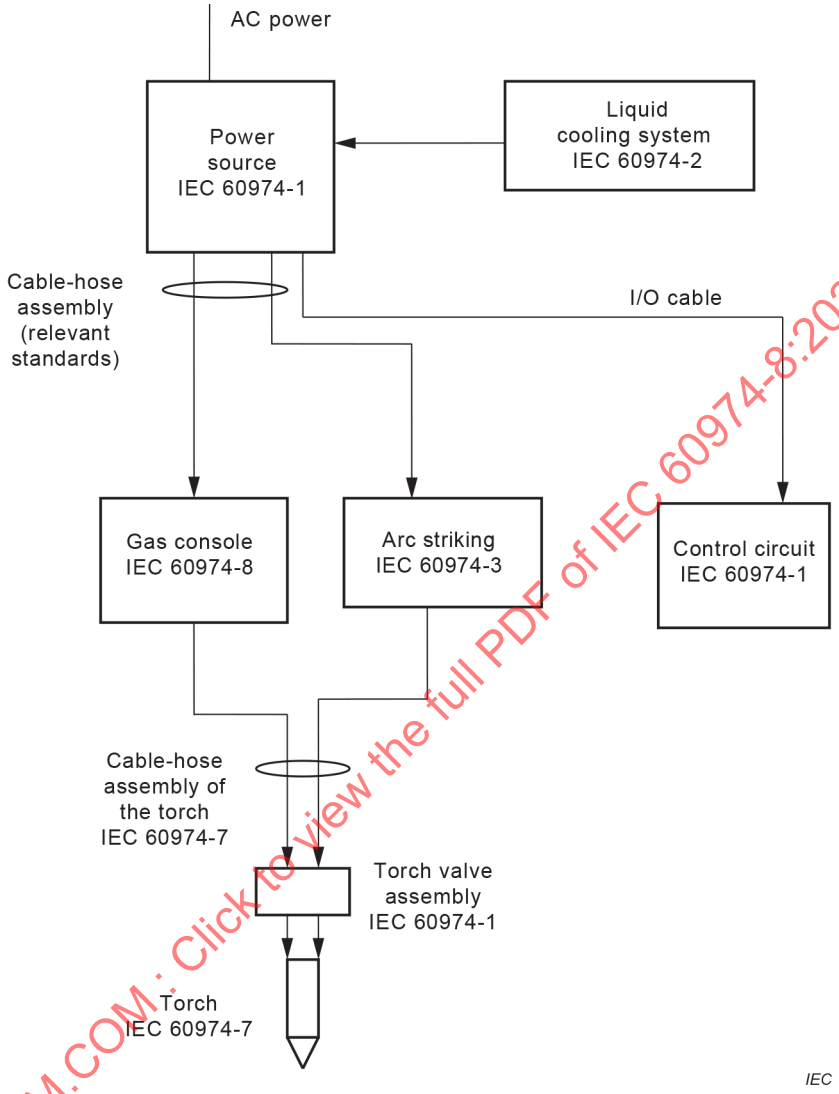
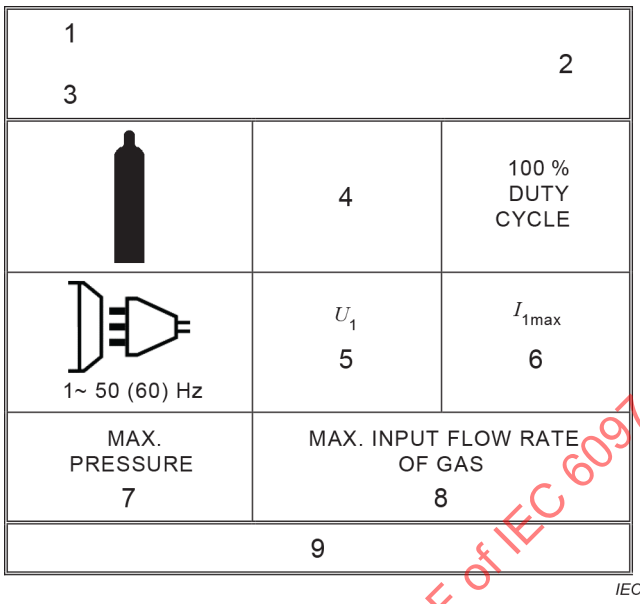


Figure A.1 – Example of a mechanized plasma system

Annex B
(informative)

Example of a rating plate layout



Key

1 Name and address of the manufacturer or distributor or importer and optionally a trademark and the country of origin, if required

2 Reference to this document conforming that the GAS CONSOLE complies with its requirements

3 Type (identification) as given by the manufacturer and traceability of design and manufacturing data, for example, serial number

4 Type of gases used (for example, H_2 or O_2)

5 Rated supply voltage: V

6 Rated maximum supply current: A

7 Maximum inlet gas pressure: MPa (bar)

8 Maximum gas flow rating for each gas: l/min

9 Degree of protection rating: IPXX

Figure B.1 – Principle of a rating plate

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IEC 60050-195:1998, *International Electrotechnical Vocabulary (IEV) – Part 195: Earthing and protection against electric shock*
IEC 60050-195:1998/AMD1:2001

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SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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MATÉRIEL DE SOUDAGE À L'ARC –

Partie 8: Consoles de gaz pour soudage et systèmes de coupage par plasma

AVANT-PROPOS

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La Norme internationale IEC 60974-8 a été établie par le comité d'études 26 de l'IEC: Soudage électrique.

Cette troisième édition annule et remplace la deuxième édition, parue en 2009. Cette édition constitue une révision technique.

Les modifications techniques majeures par rapport à l'édition précédente sont les suivantes:

- modifications qui résultent de la publication de l'IEC 60974-1:2017;
- exigences relatives à la plaque signalétique comme celles spécifiées à l'Article 15 de l'IEC 60974-1:2017;
- exigences relatives aux instructions en 13.2.

La présente partie de l'IEC 60974 doit être utilisée conjointement avec l'IEC 60974-1.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
26/719/FDIS	26/723/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

La version française de la norme n'a pas été soumise au vote.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Dans la présente norme, les caractères d'imprimerie suivants sont utilisés:

– déclarations de conformité: *caractères italiques*.
– termes 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*, peut être consultée sur le site web de l'IEC.

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

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

INTRODUCTION

Lorsque la console est conçue pour fonctionner avec des gaz explosifs, il convient que le fabricant évalue l'applicabilité de la législation locale relative aux atmosphères explosives (exemple: Réglementation ATEX).

MATÉRIEL DE SOUDAGE À L'ARC –

Partie 8: Consoles de gaz pour soudage et systèmes de coupage par plasma

1 Domaine d'application

La présente partie de l'IEC 60974 spécifie les exigences de performance et de sécurité concernant les CONSOLES DE GAZ destinées à être utilisées avec des gaz combustibles ou de l'oxygène. Ces CONSOLES DE GAZ sont conçues pour fournir du gaz qui est utilisé pour le soudage à l'arc, le coupage par plasma, le gougeage et les procédés connexes dans des atmosphères non explosives.

La CONSOLE DE GAZ peut se trouver soit à l'extérieur, soit à l'intérieur de l'enceinte de la source de courant. Dans ce dernier cas, la source de courant doit satisfaire aux exigences de l'IEC 60974-1 et du présent document.

NOTE Voir l'Annexe A pour le schéma du système de plasma mécanisé.

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 60050-151:2001, *Vocabulaire électrotechnique international (IEV) – Partie 151: Dispositifs électriques et magnétiques*
IEC 60050-151:2001/AMD1:2013
IEC 60050-151:2001/AMD2:2014
IEC 60050-151:2001/AMD3:2019
IEC 60050-151:2001/AMD4:2020

IEC 60529:1989, *Degrés de protection procurés par les enveloppes (Code IP)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60664-1, *Coordination de l'isolement des matériels dans les réseaux d'énergie électrique à basse tension – Partie 1: Principes, exigences et essais*

IEC 60974-1:2017, *Matériel de soudage à l'arc – Partie 1: Sources de courant de soudage à l'arc*
IEC 60974-1:2017/AMD1:2019

IEC 60974-10, *Matériel de soudage à l'arc – Partie 10: Exigences de compatibilité électromagnétique (CEM)*

ISO 10225, *Matériel de soudage aux gaz — Marquage des matériels de soudage aux gaz, de coupage et pour techniques connexes*

3 Termes et définitions

Pour les besoins du présent document, les termes et définitions donnés dans l'IEC 60050-151 et 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
console de gaz
dispositif destiné à acheminer le gaz, à le mélanger ou à ces deux opérations, qui contient des appareils électriques dans une seule ou dans plusieurs enceintes, ou en structure ouverte

3.2
limite inférieure d'explosivité
LIE
concentration de gaz ou de vapeur inflammable dans l'air au-dessous de laquelle l'atmosphère gazeuse n'est pas explosive

3.3
limite inférieure d'inflammabilité
LII
concentration minimale de gaz combustible dans un mélange pour laquelle une combustion peut être déclenchée par une source d'inflammation

3.4
limite supérieure d'explosivité
LSE
concentration de gaz ou de vapeur inflammable dans l'air au-dessus de laquelle l'atmosphère gazeuse n'est pas explosive

3.5
limite supérieure d'inflammabilité
LSI
concentration maximale de gaz combustible dans un mélange pour laquelle une combustion peut être déclenchée par une source d'inflammation

3.6
console de gaz externe
CONSOLE DE GAZ qui n'est pas incorporée dans une source de courant

3.7
console de gaz interne
CONSOLE DE GAZ qui est incorporée dans une source de courant

3.8
condition de premier défaut
état dans lequel un seul moyen de protection contre les dangers est défectueux

Note 1 à l'article: Si une CONDITION DE PREMIER DEFAUT entraîne inévitablement une autre CONDITION DE PREMIER DEFAUT, les deux défaillances sont considérées comme une seule CONDITION DE PREMIER DEFAUT.

3.9
partie active dangereuse
partie active qui peut provoquer, dans certaines conditions, un choc électrique nuisible

[SOURCE: IEC 60050-195:1998, 195-06-05]

3.10
parties dangereuses
partie qu'il est dangereux d'approcher ou de toucher

4 Conditions ambiantes

Comme cela est spécifié à l'Article 4 de l'IEC 60974-1:2017.

5 Essais

5.1 Conditions d'essai

Comme cela est spécifié au 5.1 de l'IEC 60974-1:2017.

5.2 Instruments de mesure

Comme cela est spécifié au 5.2 de l'IEC 60974-1:2017.

5.3 Conformité des composants

Comme cela est spécifié au 5.3 de l'IEC 60974-1:2017.

5.4 Essais de type

Comme cela est spécifié au 5.4 de l'IEC 60974-1:2017.

Les autres essais inclus dans le présent document peuvent être effectués dans n'importe quel ordre approprié.

5.5 Essais individuels de série

5.5.1 CONSOLE DE GAZ EXTERNE

Tous les essais individuels de série doivent être effectués sur chaque CONSOLE DE GAZ EXTERNE dans l'ordre suivant:

a) examen visuel général, voir 3.1.7 de l'IEC 60974-1:2017;
b) continuité du circuit de protection, voir 10.5.3 de l'IEC 60974-1:2017;
c) rigidité diélectrique, voir 6.1.5 de l'IEC 60974-1:2017;
d) essai d'étanchéité, voir 10.3;
e) examen visuel général, voir 3.1.7 de l'IEC 60974-1:2017.

5.5.2 CONSOLE DE GAZ INTERNE

Tous les essais individuels de série doivent être effectués sur chaque CONSOLE DE GAZ INTERNE comme cela est spécifié au 5.5 de l'IEC 60974-1:2017, avec l'ajout suivant:

a) essai d'étanchéité, voir 10.3.