IEC 60730-2-5

Edition 4.0 2017-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Automatic electrical controls –
Part 2-5: Particular requirements for automatic electrical burner control systems

Commandes électriques automatiques –
Partie 2-5: Exigences particulières pour les systèmes de commande électrique automatique des brûleurs

IEC 60730-2-5:2013-11/AMD1:2017-08(en-fr)

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FOREWORD

This amendment has been prepared by IEC technical committee 72: Automatic electrical controls.

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

FDIS	Report on voting
72/1084/FDIS	72/1103/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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.

1 Scope and normative references

Replace Subclause 1.1 by the following:

1.1 Scope

This part of IEC 60730 applies to automatic electrical **burner control systems** for the **automatic control** of burners for oil, gas, coal or other combustibles intended to be used

- for household and similar use,
- in shops, offices, hospitals, farms and commercial and industrial applications.

This International Standard is applicable

- to a complete **burner control system**,
- to a separate **programming unit**,
- to a separate electronic high-voltage **ignition source**,
- to a separate **flame detector** and
- to a separate **high-temperature operation (HTO) detector**.

NOTE 1 Throughout this document, where it can be used unambiguously, the word "system" means "burner control system" and "systems" means "burner control systems".

NOTE 2 Throughout this document, the word "equipment" means "appliance and equipment."

This standard does not apply to thermoelectric flame supervision controls; thermoelectric flame supervision controls are covered by ISO 23551-6.

This document also applies to electrical **burner control systems** intended exclusively for industrial process applications e.g. those applications covered by ISO TC 244 (ISO 13577).

1.1.1 This document applies to the inherent safety, to the declared **operating values**, **operating times** and **operating sequences** where such are associated with burner safety and to the testing of automatic electrical **burner control systems** used in, on, or in association with, burners.

NOTE Requirements for specific **operating values**, **operating times** and **operating sequences** are given in the standards for appliances and equipment.

1.1.2 This document applies to AC or DC powered systems with a rated voltage not exceeding 660 V AC or 600 V DC.

1.1.3 This document does not take into account the **response value** of an **automatic action** of a **control**, if such a **response value** is dependent upon the method of mounting the **control** in the equipment. Where a **response value** is of significant purpose for the protection of the **user**, or surroundings, the value defined in the appropriate equipment standard or as determined by the manufacturer applies.

1.1.4 This document applies also to systems incorporating **electronic devices**, requirements for which are contained in Annex H.

1.1.5 This document applies to systems using NTC or PTC thermistors, additional requirements for which are contained in Annex J.

1.1.6 This document includes systems responsive to flame properties and temperature for HTO.

Delete Subclauses 1.2, 1.3 and 1.4.

1.5 *Renumber this subclause as follows:*

1.2 Normative references

Delete reference to IEC 61643-11.

Add the following new references to the existing list:

IEC 60079-20-1:2010, *Explosive atmospheres – Part 20-1: Material characteristics for gas and vapour classification – Test methods and data*

ISO 23551-6:2014, *Safety and control devices for gas burners and gas-burning appliances – Particular requirements – Part 6: Thermoelectric flame supervision controls*

Add the following instruction:

Replacement:

IEC 60127-1:2015, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*

2 Definitions

Replace the title of Clause 2 by the following:

2 Terms and definitions

Add, after 2.2 Definitions of types of control according to purpose, the following note:

NOTE Definition 2.2.23 is not applicable.

2.2.101
burner control system

Replace the existing definition by the following:

system which includes a **programming unit**, a **flame detector** or, if applicable, an **HTO detector** and may include an **ignition source** and/or **ignition device** and which monitors the **operation** of fuel burners

Note 1 to entry: The various functions of the system may be in one or more housings.

Add the following new terms and definitions:

2.2.108
HTO detector
device which provides the **programming unit** with a signal indicating presence or absence of **HTO**

Note 1 to entry: It includes the **HTO-sensor** and may include an amplifier and a relay for signal **transmission**. The amplifier and relay may be in its own housing or combined with the **programming unit**.

2.2.109
HTO-sensor
device which senses the temperature of a surface or a medium within the combustion chamber which is in direct contact with a flammable fuel-air mixture and provides a signal indicating presence or absence of **HTO**

2.2.110
auto-ignition temperature
AIT
lowest temperature (of a hot surface or the environment) at which an ignition of a flammable fuel/air mixture occurs

[SOURCE: IEC 60079-20-1:2010,3.3, modified : "or the environment" has been added in the parenthesis, "at which under specified test conditions" has been deleted and " flammable gas or vapour in mixture with air or air/inert gas" has been replaced by " flammable fuel/air mixture"]

2.2.111
high-temperature operation
HTO
operation on the basis of **auto-ignition temperature** which assures ignition and burning of fuel

Note 1 to entry: **High-temperature operation** is used e.g. in fuel cells (IEC 62282-3-100) and in industrial furnaces and associated processing equipment (ISO 13577) where ignition and burning is detected by means of sensing the temperature.

Add the following new definition 2.3.32:

2.3.32
safety shut-down

Replacement:

de-energization of the main fuel flow means as the result of the action of a limiter, a cut-out or the detection of an internal **fault** of the system

Note 1 to entry: **Safety shut-down** may include additional actions by the system.

2.3.107

Add "**flame failure response time**" *below the term* "**flame failure lock-out time**".

2.3.117

Add "**proved igniter system**" *below the term* "**proved igniter**".

2.3.121
running position

Replace the definition by the following:

position denoting that the main burner flame is established and supervised, or the burner is in **HTO** and supervised

2.3.122

Add "Void" *after term number and delete the term and definition.*

Add the following new terms and definitions:

2.3.132
HTO detector response time
period of time between the temperature falling below the defined temperature limit for **HTO** and the signal indicating the absence of **HTO**

2.3.133
HTO detector operating characteristics
that function of the **HTO detector** which indicates absence or presence of **HTO** as the output signal of the **HTO detector** relating to the input signal

Note 1 to entry: Normally the input signal is provided by a **HTO-sensor**.

2.3.134
HTO response time
period of time between the signal indicating absence of **HTO** and proceeding to **safety shut-down** or to switch over to flame supervision

2.3.135
HTO signal
output signal of the **HTO detector**

4 General notes on tests

4.2.1

Replace the word "inclusive" *by the words* "including the relevant annexes" *in the third sentence between the words "Clauses 18 to 26" and* "may" to read *"the tests of Clauses 18 to 26 including the relevant annexes".*

6 Classification

6.3 According to their purpose

Add the following subclauses:

6.3.107 – HTO detector;

6.3.108 – HTO-sensor.

6.11

In the note, replace “In the countries members of CENELEC” *by* “In member countries of CENELEC”.

7 Information

7.2.9

Table 1

Replace title of Table 1 on the first page by the following:

Table 1 (7.2 of edition 3) **– Required information and methods of providing information** (*1 of 2*)

Replace title of Table 1 on the second page by the following:

Table 1 (7.2 of edition 3) **– Required information and methods of providing information** (*2 of 2*)

In requirement 7, replace superscript "7)" *by superscript* “b” *after* “circuit”.

In requirement 15, replace superscript "8)" *by superscript* “c” *after* “enclosure”.

In requirement 31, replace superscript "5)" *by superscript* “e” *after* “component”.

In requirement 103, add “or Maximum flame failure response time”.

Add the following:

139	The defined temperature limit for **HTO**	11.3.114	D
140	**HTO detector response time**	11.3.114	D

10 Terminals and terminations

10.2.4.101 Direct plug-in connections

In the first sentence, replace “part 2-5” *by* “document”.

11 Constructional requirements

Delete subclauses 11.1 and 11.1.2.

Replace 11.3.5.2 by the following:

11.3.5.2 Systems of **class C control functions** shall include at least two switching elements to directly de-energize the safety relevant terminals.

NOTE 1 The **burner control system** is a **class C control function**.

NOTE 2 A single relay operating two independent contacts is considered to be only one switching element.

Designs where relays are used as switching elements, a non-replaceable fuse (see Table H.24 Note I) in series with two independent relay contacts with I_N fuse < 0,6 * I_e relay, are considered to comply with the following requirements for prevention of common cause **failure**.

NOTE 3 I_N: values for the fuse (see IEC 60127-1:2015, 3.16);

I_e: rated operational current of the contact (see IEC 60947-1:2007; 4.3.2.3)

In Part 1, the term

- *"safety related output terminals" is equivalent to "valve terminals".*
- *"safety shut-down" shall be used as defined in this document,*
- *"control" shall be used as "burner control systems".*

11.3.5.2.1 Measures to protect against common cause failures

Delete this subclause.

11.3.108.6

In the first sentence, after "flame failure lock-out time", *add* "or flame failure response time".

Add the following new subclause:

11.3.114 For **controls** intended for **HTO** using **HTO-sensors**, the temperature shall be monitored. In the event the temperature falls below the defined temperature limit for **HTO**, the **control** shall proceed to **safety shut-down** or switch over to flame supervision (e.g. ionization, UV, IR etc.). This function (including sensor, detector and programming unit) shall be a **class C control function** with **type 2 action**.

The defined temperature limit for **HTO** (see Table 1, requirement 139) shall be the temperature value, which includes the auto-ignition temperature, given in IEC 60079-20-1 or otherwise specified by the product standard, and the tolerances of the signal processing circuit including the sensor.

11.4 Actions

11.4.3 Type 2 action

Replace the text of the replacement by the following:

Any **type 2 action** shall be so designed that the **manufacturing deviation** and **drift** of its **operating value**, **operating time** or **operating sequence** is within the limits declared in Table 1, requirements 46, 101 to 115 inclusive, 123 to 125 inclusive, 139 and 140.

11.101.4

Replace the existing text by the following:

An open circuit of the **flame sensor/HTO-sensor** or its connecting cables shall cause loss of the **flame signal/HTO-sensor signal**.

11.101.6

Delete the compliance statement after the first paragraph.

Add the following new subclause:

11.101.7 **HTO-sensors** shall only react to temperature.

NOTE For selecting the position of the **HTO-sensor** in the application, the effect of exposing it to radiant heat directly from the flame is taken into account.

Compliance with 11.101.1 to 11.101.7 inclusive is checked by inspection, test and/or measurement.

15 Manufacturing deviation and drift

15.1

Replace the existing text by the following:

Systems shall have adequate consistency of manufacture with regard to their declared **operating times**, **operating sequences**, **flame detector operating characteristics**, **HTO detector operating characteristics** and **proved igniter operating value**.

15.3

Replace the existing text by the following:

The appropriate **operating time**, **operating sequence**, **flame detector operating characteristics**, **HTO detector operating characteristics** and **proved igniter operating value** shall be recorded for the sample.

15.4

Replace the existing text by the following:

Three tests shall be conducted for each **operating time**, each operating sequence, **flame detector operating characteristics**, **HTO detector operating characteristics** and each **proved igniter operating value** declared.

15.5 Operating times

In the third paragraph, add the following to item c):

c) or flame failure response time;

Add the following new item t):

t) **HTO detector response time**.

15.7 Flame detector operating characteristics and proved igniter operating value

Replace the existing title and text by the following:

15.7 Flame detector operating characteristics, HTO detector operating characteristics and proved igniter operating value

The operating characteristics of **flame detectors**, **HTO detector** and **proved igniter operating value** shall be measured under the following conditions:

a) at V_R and (20 ± 5) °C;

b) at 0,85 V_R and 0 °C or T_{min}, whichever is lower, and

c) at 1,1 V_R and 60 °C or $\boldsymbol{T_{max}}$, whichever is higher.

The measured values shall be as declared in Table 1 requirements 123, 124, 125, 132 and 139 as applicable.

The details of the measuring equipment shall be arranged between the manufacturer and the test house.

If a lamp is used for response to the visible range of light, it shall have a colour temperature of 2 856 K.

NOTE The preceding paragraph is not applicable in the USA and Canada.

17 Endurance

17.16.102.1 Test sequence and conditions

In the second paragraph, after "**flame detector**", *add* "**and/or HTO detector**".

After the second paragraph, add the following:

*The **HTO** function, if applicable shall be included in the sequence.*

17.16.108 Evaluation of compliance

Replace the first paragraph by the following:

*After completion of all applicable tests of 17.16.101 to 17.16.107 inclusive, the sample shall be retested according to Clause 15. The **operating times**, **operating sequence**, **flame detector operating characteristics**, **HTO detector operating characteristics** and **proved igniter operating value** shall be as declared in Table 1.*

23 Electromagnetic compatibility (EMC) requirements – emission

In the title, replace "emission" *by* "Emission".

26 Electromagnetic compatibility (EMC) requirements – immunity

In the title, replace "immunity" *by* "Immunity".

Annex H – Requirements for electronic controls

Add the following new clause:

H.6 Classification

This clause of Part 1 is applicable except as follows:

H.6.18.2

Addition:

The **reset** from **lock-out** function as specified in 11.102 is a **class B control function**.

H.6.18.3

Addition:

Burner control systems as specified in 11.3.101 to 11.3.113 inclusive are **class C control functions**.

H.26 Electromagnetic compatibility (EMC) requirements – Immunity

H.26.2

Replace "H.26.5" *by* "H.26.4".

Add the following new subclause:

H.26.4 Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests

Addition:

The test shall be performed

a) during stand-by time;

b) during start-up period;

*d) in the **running position**;*

*e) in the **lock-out** position.*

*The system shall tolerate harmonics and interharmonics including mains signalling at a.c. power port, so that, when tested in accordance with H.26.4, either it shall continue to function in accordance with the requirements of this document or it may proceed to **safety shut-down**, which may be followed by a **system restart** or, if in **volatile lock-out**, it may proceed to a **system restart**.*

NOTE 101 **Non-volatile lock-out** excludes the use of **system restart**.

H.26.5 Voltage dips and voltage interruptions in the power supply network

Replace the subclause title by the following:

H.26.5 Voltage dips, voltage interruptions and voltage variations in the power supply network

Add the following new subclause:

H.26.5.1.2 Test procedure for voltage dips and interruptions

Addition:

The test shall be performed three times in each of the following operating modes:

*a) during pre-purge or **waiting time**;*

*b) during **start-up lock-out time**(**s**);*

*c) in the **running position**;*

*d) in the **lock-out** position.*

*Between the voltage dips, short interruptions and voltage variations, a **waiting time** of at least 10 s shall be observed.*

The system shall tolerate voltage dips and short interruptions in the electricity supply in accordance with the requirements of Table H.14.

Compliance shall be as follows:

*1) Duration of half and one cycle of the supply waveform: it shall continue to function in accordance with the requirements of this document. It shall neither proceed to **safety shut-down** or **lock-out**, nor shall it **reset** from **lock-out**;*

*2) Duration of 2,5, 25 and 50 cycles: either it shall perform as in a) or it may proceed to **safety shut-down** followed by a **system restart** or, if in **volatile lock-out**, it may proceed to a **system restart**.*

NOTE 101 **Non-volatile lock-out** excludes the use of **system restart**.

*When the power supply is restored, the **system restart** shall comply with the requirements for a start-up sequence.*

*Requirement 2) can be ignored, provided that the power **failure** is less than 60 s and occurs within 60 s after call for heat. On restoration of the power, the programme may be continued from the point at which it was interrupted.*

*A shortened start-up sequence, for example, a start-up sequence without pre-purge or **waiting time**, is allowed, provided that the power **failure** occurs within 60 s after the end of the start-up sequence and is shorter than 60 s.*

H.26.5.2 Test values

Replace the title and text by the following:

H.26.5.2 Voltage variation test

H.26.5.2.1 Test levels for voltage variations

The duration and test values in Table H.101 shall be applied.

Add the following new subclause:

H.26.5.2.2 Test procedure

Replacement:

The control shall operate according to the functional specification (see 11.3.105) at least within the voltage tolerance band of the rated voltage $^{+10}_{-15}$ %, and below – 15 % of the rated voltage the control shall stay safe.

The test apparatus and procedures shall be as described in IEC 61000-4-11. The duration of the voltage changes and the time for which the reduced voltages are to be maintained are