

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Automatic electrical controls –
Part 2-5: Particular requirements for automatic electrical burner control systems**
(standards.iteh.ai)

**Dispositifs de commande électrique automatiques –
Partie 2-5: Exigences particulières pour les systèmes de commande électrique
automatiques des brûleurs**





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AUTOMATIC ELECTRICAL CONTROLS –

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

FOREWORD

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International Standard IEC 60730-2-5 has been prepared by IEC technical committee 72: Automatic electrical controls.

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

FDIS	Report on voting
72/922/FDIS	72/929/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 part 2-5 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the fourth edition (2010) of that publication. Consideration may be given to future editions of, or amendments to, IEC 60730-1.

The title of IEC 60730-2-5 Ed. 4 has been updated to the title of IEC 60730-1 Ed. 5.0. However, IEC 60730-2-5 Ed. 4.0 has not been updated in accordance with the technical requirements in IEC 60730-1 Ed. 5.0.

This part 2-5 supplements or modifies the corresponding clauses in IEC 60730-1 so as to convert that publication into the IEC standard: Safety requirements for automatic electrical burner control systems.

Where this part 2-5 states "addition", "modification", or "replacement", the relevant requirement, test specification or explanatory matter in Part 1 should be adapted accordingly.

Where no change is necessary, this part 2-5 indicates that the relevant clause or subclause applies.

In the development of a fully international standard, it has been necessary to take into consideration the differing requirements resulting from practical experience in various parts of the world and to recognize the variation in national electrical systems and wiring rules.

The "in some countries" notes regarding differing national practices are contained in the following subclauses:

- 2.3.127
- 6.11
- 15.7
- 17.16.102.1
- H.26.11.103
- Table H.21, Note 7

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In this publication:

- 1) The following print types are used:
 - Requirements proper: in roman type;
 - *Test specifications: in italic type;*
 - Explanatory matter; in small roman type;
 - Words defined in Clause 2: **bold**.
- 2) Subclauses, notes, tables and figures which are additional to those in Part 1 are numbered starting from 101, *additional* annexes are lettered AA, BB, etc.

A list of all parts of the IEC 60730 series, under the general title *Automatic electrical controls* 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.

AUTOMATIC ELECTRICAL CONTROLS –

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

1 Scope and normative references

This clause of Part 1 is applicable except as follows:

1.1 Replacement:

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 for household and similar use including heating, air conditioning and similar use.

This part 2-5 is applicable to a complete burner control system and to a separate **programming unit**. This part 2-5 is also applicable to a separate electronic high-voltage **ignition source** and to a separate **flame detector**.

NOTE Separate **ignition devices** (electrodes, pilot burners, etc.) are not covered by this part 2-5 unless they are submitted as part of a burner control system. Requirements for separate ignition transformers are contained in IEC 60989.

Throughout this part 2-5, where it can be used unambiguously, the word "system" means "burner control system" and "systems" means "burner control systems".

Systems utilizing thermoelectric flame supervision are not covered by this part 2-5.

1.1.1 This part 2-5 applies to the inherent safety, to the manufacturer's 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.

Systems for equipment not intended for normal household use, but which nevertheless may be used by the public, such as equipment intended to be used by laymen in shops, in light industry and on farms, are within the scope of this part 2-5.

This part 2-5 applies to systems using NTC or PTC thermistors, additional requirements for which are contained in Annex J.

This part 2-5 does not apply to systems designed exclusively for industrial applications.

1.1.2 This part 2-5 applies to **manual controls** when such are electrically and/or mechanically integral with **automatic controls**.

NOTE Requirements for manual switches not forming part of an **automatic control** are contained in IEC 61058-1.

Throughout this part 2-5, the word "equipment" means "appliance and equipment".

1.2 Replacement:

This part 2-5 applies to systems with a rated voltage not exceeding 660 V and with a rated current not exceeding 63 A.

1.3 Replacement:

This part 2-5 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 household equipment standard or as determined by the manufacturer applies.

NOTE This part 2-5 includes systems responsive to flame properties.

1.4 Replacement:

This part 2-5 applies also to systems incorporating **electronic devices**, requirements for which are contained in Annex H.

1.5 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

IEC 60068-2-6, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

[IEC 60730-2-5:2013](https://standards.iteh.ai/catalog/standards/sist/6dcf345b-d881-4ca1-8a13-b4e16413282/iec-60730-2-5-2013)

IEC 61643-11, *Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems – Requirements and test methods*

2 Definitions

This clause of Part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

Additional definitions:

2.2.101

burner control system

system which includes a **programming unit**, a **flame 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.

2.2.102**flame detector**

device which provides the **programming unit** with a signal indicating the presence or absence of flame

Note 1 to entry: It includes the **flame 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**.

2.2.103**flame sensor**

device which senses the flame and provides the input signal to the **flame detector** amplifier

Note 1 to entry: Examples are optical sensors and flame electrodes (flame rods).

2.2.104**ignition source**

electrical or electronic system component which provides energy to an **ignition device**

Note 1 to entry: It may be separated from or incorporated in the **programming unit**. Examples are ignition transformers and electronic high-voltage generators.

2.2.105**ignition device**

device mounted on or adjacent to a burner for igniting fuel at the burner

Note 1 to entry: Examples are **pilot** burners, spark electrodes and hot surface igniters.

2.2.106**programming unit**

device which controls the burner **operation** in a declared sequence from start-up to shut-down within declared timings and in response to signals from regulating, limiting and monitoring devices

2.2.107**multitry system**

system that allows more than one **valve open period** during its declared **operating sequence**

2.3 Definitions relating to the function of controls**2.3.30** T_{\max}

Replace "switch head" by "burner control system."

Additional definitions:

2.3.101**automatic recycle**

automatic repetition of the start-up procedure, without manual intervention, following loss of the supervised flame and subsequent fuel supply shutoff

2.3.102**controlled shut-down**

de-energization of the fuel flow means as a result of the opening of a control loop by a control device such as a **thermostat** leading the system to return to the **start position**

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

2.3.103**flame detector response time**

period of time between the loss of the sensed flame and the signal indicating the absence of flame

2.3.104**flame detector operating characteristics**

that function of the **flame detector** which indicates absence or presence of flame as the output signal of the **flame detector** relating to the input signal

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

2.3.104.1**signal for presence of flame****S₁**

minimum signal which indicates the presence of flame when there was previously no flame

2.3.104.2**signal for absence of flame****S₂**

maximum signal which indicates the loss of flame

Note 1 to entry: **S₂** is less than **S₁**.

2.3.104.3**maximum flame signal****S_{max}**

maximum signal which does not affect the timings or the sequence

2.3.104.4**signal for visible light flame simulation****S₃**

minimum signal which indicates the presence of flame during the visible light **flame simulation** test

Note 1 to entry: **S₃** is less than **S₂**.

2.3.105**self-checking flame detector**

flame detector which checks for correct **operation** of the **flame detector** and its associated electronic circuitry while the burner is in the **running position**

2.3.106**flame detector self-checking rate**

frequency of the self-checking function of the **flame detector** (in number of **operations** per unit of time)

2.3.107**flame failure lock-out time**

period of time between the signal indicating absence of flame and **lock-out**

2.3.108**flame failure re-ignition time****relight time**

period of time between the signal indicating absence of flame and the signal to energize the **ignition device**, during which the fuel supply is not shut off

2.3.109

flame signal

output signal of the **flame detector**

2.3.110

flame simulation

condition which occurs when the **flame detector** indicates the presence of flame when in reality no flame is present

2.3.111

ignition time

period of time during which the **ignition device** is energized

2.3.112

lock-out

process in which the system goes into one of the following **lock-out** conditions, following **safety shut-down**

2.3.112.1

non-volatile lock-out

condition such that a restart can only be accomplished by a manual **reset** of the system and by no other cause

2.3.112.2

volatile lock-out

condition such that a restart can be accomplished by either a manual **reset** of the system or by an interruption of the power supply and its subsequent restoration

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2.3.113

main flame establishing period

period of time between the signal to energize the main fuel flow means and the signal indicating presence of the main burner flame

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2.3.114

pilot flame establishing period

period of time between the signal to energize the **pilot** fuel flow means and the signal indicating presence of the **pilot** flame

2.3.115

post-ignition time

period of the **ignition time** between the signal indicating presence of flame and the signal to de-energize the **ignition device**

2.3.116

pre-ignition time

period of the **ignition time** between the signal to ignite and the signal to energize the fuel flow means

2.3.117

proved igniter

system in which the fuel flow means is energized only after the availability of sufficient energy to ignite the fuel has been verified

Note 1 to entry: Examples are systems using spark supervision and those using proved hot surface igniters.

2.3.117.1**proved igniter operating value**

signal which indicates that the **proved igniter** has the energy to ignite the fuel

2.3.117.2**igniter proving time**

period of time between the signal to energize the **proved igniter** and the signal to energize the fuel flow means

2.3.117.3**igniter failure response time**

period of time between loss of the supervised **proved igniter** and the signal to de-energize the fuel flow means

2.3.118**purge time**

period during which air is introduced to displace any remaining air/fuel mixtures or products of combustion from the combustion zone and flue ways

Note 1 to entry: No fuel is admitted during this period.

2.3.118.1**post-purge time**

purge time that takes place immediately following the shutting off of the fuel supply

2.3.118.2**pre-purge time**

purge time that takes place between **initiation** of a burner control sequence and the admission of fuel to the burner

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2.3.119**re-ignition****relight**

process by which, following loss of the **flame signal**, the **ignition device** will be re-energized without interruption of the fuel flow means

2.3.120**recycle time**

period of time between the signal to de-energize the fuel flow means following the loss of flame and the signal to begin a new start-up procedure

2.3.121**running position**

position denoting that the main burner flame is established and supervised

2.3.122**safety shut-down**

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.

2.3.123**start position**

position which denotes that the system is not in the **lock-out** condition and has not yet received the **start signal**, but can proceed with the start-up sequence if required

2.3.124

start signal

signal, for example, from a **thermostat**, which releases the system from its **start position**

2.3.125

start-up lock-out time

period of time between the signal to energize the fuel flow means and **lock-out**

Note 1 to entry: For systems which control two separate fuel flow means, two different **start-up lock-out times** are possible (first and second **start-up lock-out times**).

2.3.126

waiting time

period between the **start signal** and the signal to energize the **ignition device**

Note 1 to entry: For burners without fans, natural ventilation of the combustion chamber and the flue passages normally takes place during this time.

2.3.127

valve open period

for **multitry systems**, the period of time between the signal to energize the fuel flow means, and the signal to de-energize the fuel flow means, if proof of the supervised burner flame is not established

Note 1 to entry: In the USA, this period is referred to as the "trial-for-ignition period."

2.3.128

valve sequence period

for **multitry systems**, the sum of all valve opening periods prior to **lock-out**, if proof of the supervised burner flame is not established

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2.3.129

system restart

process by which, after a **safety shut-down**, a full start-up procedure is automatically repeated

2.3.130

reset from lock-out function

function that provides **reset** from **lock-out** allowing the system to attempt a restart

Note 1 to entry: The **reset** function may be performed by various electric/electronic (mobile) devices.

2.3.131

common cause failures

failures of different items, resulting from a single event, where these **failures** are not consequences of each other

Note 1 to entry: **Common cause failures** should not be confused with common mode failures.

[SOURCE: IEC 60050-191:1990,191-04-23]

2.5 Definitions of types of control according to construction

Additional definitions:

2.5.101

system for permanent operation

system which is intended to remain in the **running position** for longer than 24 h without interruption

2.5.102

system for non-permanent operation

system which is intended to remain in the **running position** for less than 24 h

Additional definitions:

2.101 Definitions relating to the type of burner (see 6.101)

2.101.1

continuous ignition

type of ignition which, once placed in **operation**, is intended to remain energized continuously until it is manually interrupted

2.101.2

continuous pilot

pilot which, once placed in **operation**, is intended to remain ignited continuously until it is manually interrupted

2.101.3

direct ignition

type of ignition which is applied directly to the main burner without the use of a **pilot**

2.101.4

expanding pilot

form of **continuous pilot** where the **pilot** flame is increased or expanded when required to ignite the main burner and reduced either immediately after main burner ignition, or after the main flame is shut off

2.101.5

full rate start

condition in which the main burner ignition and subsequent flame supervision occur at full fuel rate

2.101.6

intermittent ignition

type of ignition which is energized when an appliance is called on to operate and which remains continuously energized during each period of main burner **operation** and where the ignition is de-energized when the main burner operating cycle is completed