

Subject 60730-2-5 (372)

February 1, 2013

SUMMARY OF TOPICS

The following standard is being proposed for ballot and comment:

1. Proposed Third Edition of the Harmonized Standard for Automatic Electrical Controls for Household and Similar Use, Part 2: Particular Requirements for Automatic Electrical Burner Control Systems, UL 60730-2-5.

STP BALLOTS DUE: APRIL 2, 2013

COMMENTS DUE: APRIL 2, 2013

1. Proposed Third Edition of the Harmonized Standard for Automatic Electrical Controls for Household and Similar Use, Part 2: Particular Requirements for Automatic Electrical Burner Control Systems, UL 60730-2-5.

BACKGROUND

Responding to a request by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) to develop a harmonized North American binational IEC-based standard covering electrical burner control systems that could be utilized in the domestic and international marketplaces, CSA America, CSA Canada and UL, in conjunction with the Z21/CSA TAG on Standards for Automatic Gas Controls and the Burner Ignition System Technical Harmonization Committee (THC), have drafted this harmonized proposal. This proposal has harmonized the American National Standards Institute (ANSI) Standard for Burner Ignition System and Components, Z21.20, UL 372, and the Canadian Gas Association (CGA) Standard for Burner Ignition System and Components, CSA C22.2 No. 199, with edition 3.2 of IEC 60730-2-5, the Standard for Automatic Electrical Controls for Household and Similar Use – Part 2-5: Particular Requirements for Automatic Electrical Burner Control Systems.

The publication of this standard will afford manufacturers the ability to have products conform to a single set of requirements utilizing this standard together with the UL 60730-1 Part 1 standard covering the general requirements for Automatic Electrical Controls. The end goal is one standard and one product design which can more easily be brought to market around the world. IEC standards are being adopted at an ever increasing rate. Increased world trade and the development of the emerging markets have accelerated this process. Industry organizations such as AHRI and the Association of Home Appliance Manufacturers (AHAM) have acknowledged the worldwide movement to IEC- based standards and have advocated harmonization.

RATIONALE

Proposal submitted by: Izzy Savitzky, UL (on behalf of the Burner Ignition System Technical Harmonization Committee (THC))

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents

Document Sharing Hub

This is the proposed UL 60730-2-5, the binational Standard for Automatic Electrical Controls for Household and Similar Use – Part 2-5: Particular Requirements for Automatic Electrical Burner Control Systems. This is an IEC-based standard covering electrical burner control systems and components, which has harmonized the American National Standards Institute (ANSI) Standard for Burner Ignition System and Components, Z21.20, UL 372, and the Canadian Gas Association (CGA) Standard for Burner Ignition System and Components, CSA C22.2 No. 199, with the IEC 60730-2-5, the Standard for Automatic Electrical Controls for Household and Similar Use – Part 2-5: Particular Requirements for Automatic Electrical Burner Control Systems.

The numbering system used in this draft harmonized standard is based on the numbering system of IEC 60730-1 and IEC 60730-2-5.

The title for the harmonized standard is consistent with the IEC 60730-2-5 title and the standard is referenced as the Standard for Automatic Electrical Controls for Household and Similar Use – Part 2-5: Particular Requirements for Automatic Electrical Burner Control Systems

These requirements in the standard follow the IEC 60730 series, two part formatting structure. The Part 1 contains the general requirements to be used in conjunction with the particular Part 2 standards. The Part 2 particular controls standards may include additional requirements or requirements that supplement or modify those of the Part 1 standard

In the interest of creating the harmonized standard, some modified test requirements referenced in IEC 60730-1 and IEC 60730-2-5 Annex H Clause H.26 have been accepted into this proposal. Clause H26 covers testing for effect of mains-borne perturbations and EMC phenomena. Some of these mains-borne perturbations and EMC tests are modified from currently required EMC tests or are expanded EMC tests and may require testing to comply

The Technical Harmonization Committee (THC) has reviewed the requirements of the aforementioned standards and considered the need for National Differences. The THC determined certain National Differences should be maintained and these National differences are identified in the proposal with DV in the clause number. Some of these National Differences include:

- a) Additional coverage for burner control system components. Devices such as thermoelectric flame supervision, pilot burners, and oxygen depletion safety shut-off systems (ODS), thermoelectric safety shut-off devices, fast-acting thermocouples, electrodes, pilot burners, and other components are covered in Annex DVKK. This is based on the current published requirements.
- b) Additional coverage for solid-state oil igniters are covered in Annex DVMM. This is based on the current published requirements
- c) Addition of coverage for protection against humid conditions in 12.2.2. This is based on the current humidity test requirements.
- d) Addition of coverage for manufacturing and production testing in Annex DVLL. This is based on the current requirements.

The National Difference Page and IEC Foreword have been provided for your reference in reviewing this document. However, they are not considered to be part of the ANSI balloted material.

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

CONTENTS

NATIONAL DIFFERENCES	8
----------------------------	---

FOREWORD	9
----------------	---

1 Scope and normative references	12
1.5 Normative References	13
2 Definitions	15
2.2 Definitions of types of control according to purpose	15
2.3 Definitions relating to the function of controls	16
2.5 Definitions of types of control according to construction	21
2.101 Definitions relating to type of burner (see 6.101)	21
3 General requirements	22
4 General notes on tests	23
4.1 Conditions of test	23
4.2 Samples required	23
4.3 Instructions for test	23
5 Rating	23
6 Classification	23
6.1 According to nature of supply	24
6.1.1 Systems for a.c. only	24
6.1.3 Not applicable	24
6.3 According to their purpose	24
6.4 According to features of automatic action	24
6.7 According to ambient temperature limits of the switch head	25
6.10 According to number of cycles of actuation (M) of each manual action	25
6.11 According to number of automatic cycles (A) of each automatic action	25
6.15 According to construction	26
6.16 Not applicable	26
6.101 According to type of burner	26
6.102 According to type of pilot	26
6.103 According to type of ignition	26
6.104 According to starting fuel rate	26
7 Information	26
8 Protection against electric shock	28
8.1 General requirements	28
8.1.101 High-voltage ignition sources	29
8.3 Capacitors	30
9 Provision for protective earthing	30
10 Terminals and terminations	30
11 Constructional requirements	30
11.1 Materials	30
11.1.2 Not applicable	30
11.2 Protection against the risk of electric shock	31
11.3 Actuation and operation	31
11.3.4 Setting by the manufacturer	31
11.3.5 Contacts – General	31
11.3.9 Pull-cord actuated control	32
11.3.101 Burner control circuits	32
11.3.110 Visible light flame simulation test	34
11.4 Actions	34

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents

Document Sharing Hub

11.4.3	Type 2 action	34
11.4.15	Not applicable	35
11.4.101	Type 2.V action	35
11.4.102	Type 2.W action	35
11.10	Equipment inlets and socket-outlets	35
11.11	Requirements during mounting, maintenance and servicing	36
11.13	Not applicable	36
11.101	Flame detector constructional requirements	36
12	Moisture and dust resistance	36
13	Electric strength and insulation resistance	37
13.1	Insulation resistance	37
13.2	Electric strength	38
14	Heating	38
15	Manufacturing deviation and drift	39
15.5	Operating times	39
15.6	Operating sequence	41
15.7	Flame detector operating characteristics and proved igniter operating value	41
16	Environmental stress	41
17	Endurance	41
17.1	General requirements	41
17.1.3	Test sequence and conditions	42
17.16	Tests for particular purpose systems	42
17.16.101	Thermal cycling test for electronic systems	43
17.16.102	Endurance test of automatic and manual action at normal operating rate	43
17.16.103	Vibration test	44
17.16.104	Endurance test of automatic action at accelerated rate	44
17.16.105	Lock-out reset test	44
17.16.106	Components of systems which are declared for operation in an ambient temperature above 125 °C	45
17.16.107	Electric strength requirements	45
17.16.108	Evaluation of compliance	45
18	Mechanical strength	45
18.2	Impact resistance	45
19	Threaded parts and connections	45
20	Creepage distances, clearances and distances through solid insulation	45
21	Resistance to heat, fire and tracking	46
22	Resistance to corrosion	46
23	Electromagnetic compatibility (EMC) requirements – emission	46
24	Components	46
25	Normal operation	46
26	Electromagnetic compatibility (EMC) requirements – immunity	46
27	Abnormal operation	46
27.3	Over-voltage and under-voltage test	46
28	Guidance on the use of electronic disconnection	46

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

Annexes

Annex H (normative) Requirements for electronic controls

H.7 Information	48
H.11 Constructional requirements	48
H.11.12 Controls using software	48
H.17 Endurance	49
H.26 Electromagnetic compatibility (EMC) requirements – immunity	49
H.26.5 Voltage dips and voltage interruptions in the power supply network	50
H.26.6 Test of influence of voltage unbalance	54
H.26.8 Surge immunity test	54
H.26.9 Electrical fast transient/burst test	55
H.26.10 Ring wave test	56
H.26.11 Electrostatic discharge test	56
H.26.12 Radio-frequency electromagnetic field immunity	57
H.26.13 Test of influence of supply frequency variations	59
H.26.14 Power frequency magnetic field immunity test	59
H.26.15 Evaluation of compliance	60
H.27 Abnormal operation	60
H.27.1.2 <i>Replacement:</i>	60
H.27.1.3 <i>Replacement:</i>	61
H.27.1.4 Electronic circuit fault conditions	64

Annex J (normative) Requirements for controls using thermistors

J.1 Scope	67
J.20 Creepage distances, clearances and distances through insulation	67

Annex BB (informative) Functional characteristics of burner control systems to be specified by the relevant appliance standards, as applicable

Annex DVKK (normative) Requirements for Components of Burner Control Systems

DVKK.1 Scope	69
DVKK.2 Definitions	69
DVKK.3 General requirements	70
DVKK.4 Requirements for pilot burners	71
DVKK.5 Requirements for oxygen depletion safety shutoff system (ODS)	74
DVKK.6 Requirements for other components	75
DVKK.7 Addition of requirements covering the thermal stress test:	78

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

Annex DVLL (normative) Manufacturing and Production Testing

Annex DVMM (normative) Requirements for Solid-State Oil Igniters

DVMM.1 Scope	82
DVMM.2 Definitions	82
DVMM.3 General Requirements	82
DVMM.4 Construction	82
DVMM.5 Tests	83

PROPOSAL

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents

Document Sharing Hub

NATIONAL DIFFERENCES

GENERAL

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60730-2-5, , copyright 2008 are indicated by notations (differences) and are presented in bold text.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are national differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

INTERNATIONAL ELECTROTECHNICAL COMMISSION

AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE – Part 2-5: Particular Requirements for Automatic Electrical Burner Control 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.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

This consolidated version of IEC 60730-2-5 consists of the third edition (2000) [documents 72/430/FDIS and 72/447/RVD], its amendment 1 (2004) [documents 72/632A/FDIS and 72/642/RVD] and its amendment 2 (2008) [documents 72/770/FDIS and 72/773/RVD].

The amendment 2 is based on 60730-2-5, Edition 3 (2000) and its Amendment 1 (2004).

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 3.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

This Part 2-5 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the third edition (1999) and Amendment 1 (2003) and Amendment 2 (2007) of that publication. Consideration may be given to future editions of, or amendments to, IEC 60730-1.

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
- H.26.10
- H.26.11.103
- Table H.27.1, Note 7
- H.27.1.3

In this publication:

- 1) The following print types are used:
 - Requirements proper: in roman type;
 - *Test specifications: in italic type;*
 - EXPLANATORY MATTER: IN SMALLER ROMAN TYPE.

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

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.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result 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.

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE – 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.

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 .

1.1DV.1 D2 Modification of 1.1 by adding the following text to the note:

Separate ignition devices (electrodes, pilot burners, etc.) are covered by this part 2-5 (Refer to Annex DVKK)

Requirements for separate ignition transformers are covered in Standard for Specialty Transformers, UL 506, and CSA C22.2 No. 13, Standard for Luminous Tube Signs, Oil and Gas Burner Ignition Equipment, Cold-Cathode Interior Lighting.

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.

1.1DV.2 D2 Modification of 1.1 by adding the following text:

Devices such as thermoelectric flame supervision, pilot burners, and oxygen depletion safety shut-off systems (ODS), thermoelectric safety shut-off devices, fast-acting thermocouples, and other components are covered in Annex DVKK.

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.

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.

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

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

1.1.1DV D2 Modification of 1.1.1 by adding the following text:

This part 2-5 does 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.

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.

1.2DV DR Modification of 1.2 by adding the following text and note:

The maximum control output voltage is 600 V. The maximum current is unlimited.

The primary input circuit of a system shall be a two-wire, one-side-grounded system, having a voltage rating of not more than a nominal 120 volts. A switch or protective device shall be in the circuit electrically connected to the ungrounded supply conductor.

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.

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 60068-2-6:1995,
Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)

IEC 60127-1:2006,
Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

IEC 60947-1:2007,
Low-voltage switchgear and controlgear – Part 1: General rules

IEC 60947-5-1:2003,
Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices

IEC 60989:1991,
Separating transformers, autotransformers, variable transformers and reactors

1.5DV DC Modification by adding the following to 1.5:

IEC 61643-1,
(Low-voltage surge protective devices – Part 1: Surge protective devices connected to low-voltage power distribution systems – Requirements and tests)

ANSI/ASME B1.1-2003,
Unified Inch Screw Threads (UN and UNR Thread Form)

ANSI/ASME B1.20.1-1983 (R1992),
Pipe Threads, General Purpose (Inch)

ANSI Z21.21-2005/CSA 6.5-2005,
Automatic Valves for Gas Appliances

ANSI Z21.78-2005/CSA 6.20-2005,
Combination Gas Controls for Gas Appliances

ANSI Z223.1/NFPA 54-2006,
National Fuel Gas Code

CAN/CSA B140.2.1-M90 (R2005),
Oil Burners; Atomizing Type

CSA B 149.1-10,
Natural Gas and Propane Installation Code

CAN/CSA-B149.3-10 ,
Code for the Field Approval of Fuel-related Components on Appliances and Equipment

CSA C22.2 No. 3-M1988 (R2004),
Electrical Features of Fuel Burning Equipment

CSA C22.2 No. 13-1962 (R2011),
Transformers for Luminous-Tube Signs, Oil- and Gas-Burner Ignition Equipment, Cold-Cathode Interior Lighting

CSA C22.2 No. 66.1,
Low Voltage Transformers – Part 1: General Requirements

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

**UL 506,
Specialty Transformers**

**UL 1449,
Surge Protective Devices**

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 monitors the operation of fuel burners. It includes a programming unit, a flame detector and may include an ignition source and/or ignition device

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

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

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

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

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 shutdown within declared timings and in response to signals from regulating, limiting and monitoring devices

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

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 SHUTDOWN:

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. The system returns to the start position

Controlled shutdown 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

Normally the input signal is provided by a flame sensor.

2.3.104.1 SIGNAL FOR PRESENCE OF FLAME (S_1)

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

2.3.104.2 SIGNAL FOR ABSENCE OF FLAME (S_2)

maximum signal which indicates the loss of flame

S_2 is less than S_1 .

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 (S_3)

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

S_3 is less than S_2 .

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

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 REIGNITION TIME (RELIGHT TIME):

period of time between the signal indicating absence of flame and the signal to energize the ignition device. During this time period 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 shutdown

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

2.3.112.3DV D2 Addition of 2.3.112.3.DV with the following text:**HARD LOCKOUT**

The automatic action to end an ignition sequence. Reinitiating another ignition sequence requires a manual operation at the equipment or interruption of the main electrical power supply to the equipment.

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

2.3.112.4DV D2 Addition of 2.3.112.4.DV with the following text:**SOFT LOCKOUT**

The automatic action to end an ignition sequence. Reinitiating another ignition sequence is accomplished by automatic or manual means either of which may be remote from the equipment.

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

2.3.113.1DV D2 Addition of 2.3.113.1.DV with the following text:**TRIAL FOR IGNITION PERIOD**

The period of time between energizing and de-energizing the fuel flow means, if proof of the supervised flame is not established. For systems incorporating interrupted pilot ignition – also considered main burner flame establishing period.

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

Examples are systems using spark supervision and those using proved hot surface igniters.

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

2.3.117DV DE Modification of 2.3.117DV DE with the following text:**PROVED IGNITER SYSTEM****2.3.117.1 PROVED IGNITER OPERATING VALUE:**

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

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

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

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

2.3.118.3DV D2 Addition of 2.3.118.3 DV with the following text:**INTER-PURGE TIME**

On a multitry system, the purge time that takes place between the end of a trial for ignition period and reactivation of the ignition means if proof of the supervised flame is not established.

Inter-purge time is normally provided for burners where air for combustion is mechanically introduced for ventilation of the combustion chamber and flue passages before reenergizing the ignition means

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:

this position denotes that the main burner flame is established and supervised

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

2.3.122 SAFETY SHUTDOWN: 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

Safety shutdown 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:

a 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

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. 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

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

2.3.127DV DE Modification of 2.3.127 by adding the following text to the title and note:

VALVE OPEN PERIOD / TRIAL-FOR-IGNITION PERIOD

In the USA and Canada, 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

2.3.129 SYSTEM RESTART:

process by which, after a safety shutdown, a full start-up procedure is automatically repeated

2.3.130DV D2 Addition of the 2.3.130 with the following text:

SAFE START CHECK

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

an action during each start-up sequence, where the system checks for a flame signal before any fuel valve is energized.

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 type of burner (see 6.101)

2.101.1 CONTINUOUS IGNITION:

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

2.101.2 CONTINUOUS PILOT:

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

2.101.3 DIRECT IGNITION:

a 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:

a 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. The ignition is de-energized when the main burner operating cycle is completed

2.101.7 INTERMITTENT PILOT:

a pilot which is automatically ignited when an appliance is called on to operate and which remains continuously ignited during each period of main burner operation. The pilot is automatically extinguished when each main burner operating cycle is completed

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

2.101.8 INTERRUPTED IGNITION:

a type of ignition which is energized prior to the admission of fuel to the main burner and which is de-energized when the main flame is established

2.101.9 INTERRUPTED PILOT:

a pilot which is automatically ignited prior to the admission of fuel to the main burner and which is automatically extinguished when the main flame is established

2.101.10 LOW RATE START:

condition in which main burner ignition occurs at low fuel rate. Once ignition at low fuel rate occurs and the flame is proved, full main burner fuel rate may be admitted

2.101.11 PILOT:

flame, smaller than the main flame, which is utilized to ignite the main burner or burners

2.101.12DV D2 Addition of 2.101.12DV with the following text:**ON DEMAND PILOT**

a pilot which, once placed into operation, is intended to remain ignited for a predetermined period of time following an automatic or manual operation of the main burner gas valve. The pilot is automatically extinguished when no automatic or manual operation of the main burner gas valve occurs during the predetermined period of time.

2.101.13DV D2 Addition of 2.101.13DV with the following text:**FLAME FAILURE RESPONSE TIME**

the period of time between loss of the supervised ignition source or the supervised main burner flame and the action to shut off the fuel supply.

2.101.14DV D2 Addition of 2.101.14DV with the following text:**IGNITION ACTIVATION PERIOD**

The period of time between energizing the main gas valve and deactivation of the ignition means during a trial for ignition period.

2.101.15DV D2 Addition of 2.101.15DV with the following text:**AUTOMATIC RESTART TIME**

The period of time between a soft lockout and the automatic action to initiate another ignition sequence.

3 General requirements

This clause of part 1 is applicable.

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

4 General notes on tests

This clause of part 1 is applicable except as follows:

4.1 Conditions of test

4.1.1 Replacement

Unless otherwise specified, the system and each system component are tested as delivered, having been mounted as declared in table 7.2, requirement 31, in the most unfavourable position when there is more than one position.

When a separate system component is submitted, the manufacturer shall provide those other system components which may be necessary to perform the relevant tests.

4.1.7 Not applicable.

4.2 Samples required

4.2.1 Replacement

Unless otherwise specified, one sample shall be used for the tests of clauses 5 to 14 inclusive. A different sample(s) shall be used for the tests of clauses 15 to 17. At the option of the manufacturer, the tests of clauses 18 to 26 inclusive may be conducted on a new sample or on the sample(s) used for the tests of clauses 5 to 14 inclusive. The tests of clause 27 shall be conducted on a new sample.

4.3 Instructions for test

4.3.2.1 Modification

Delete "and those for a.c./d.c. at the more unfavourable supply."

4.3.2.1DV D2 Modification of 4.3.2.1 by adding the following text to the clause:

Controls declared for ac only are tested with ac rated frequency. Controls declared for dc only are tested with dc. Controls declared for ac/dc are tested at both ac and dc voltages.

4.3.2.4 Not applicable.

4.3.2.6 Replacement

For systems marked or declared for more than one rated voltage or rated current, the tests of clause 17 are made at the rated voltage and associated current (or vice versa) which produces the most unfavourable combination.

5 Rating

This clause of part 1 is applicable.

6 Classification

This clause of part 1 is applicable except as follows:

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

6.1 According to nature of supply

6.1.1 Systems for a.c. only

Replace explanatory matter as follows:

Systems intended for use on a.c. supply may only be used on a.c. supplies

6.1.3 Not applicable

6.1.3DV D1 Modification of 6.1.3 by adding the following text:

This clause is applicable.

6.3 According to their purpose

Additional subclauses:

- 6.3.101 – burner control system;
- 6.3.102 – flame detector;
- 6.3.103 – programming unit;
- 6.3.104 – ignition device;
- 6.3.105 – electronic high-voltage ignition source;
- 6.3.106 – flame sensor.

6.4 According to features of automatic action

6.4.1 Not applicable.

6.4.3 Addition

Burner control systems are classified as having Type 2 action

6.4.3.12 Not applicable

Additional subclauses

- 6.4.3.101 – non-volatile lock-out (Type 2.V);
- 6.4.3.102 – volatile lock-out (Type 2.W);

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub

- 6.4.3.103 – non-permanent operation (Type 2.AC);
- 6.4.3.104 – permanent operation (Type 2.AD);
- 6.4.3.105 – spark supervision (Type 2.AE);
- 6.4.3.106 – air/pressure flow supervision (Type 2.AF);
- 6.4.3.107 – position-checked external devices (Type 2.AG);
- 6.4.3.108 – visible light flame simulation check (Type 2.AH);
- 6.4.3.109 – proved hot surface igniter (Type 2.AI).

6.7 According to ambient temperature limits of the switch head

6.7.1 Modification

Replace "Control with a switch head" by "System and system components".

6.7.2 Modification

Replace "Control with a switch head" by "System and system components".

6.10 According to number of cycles of actuation (M) of each manual action

6.10.5 to 6.10.7 Not applicable.

6.11 According to number of automatic cycles (A) of each automatic action

Addition:

In the countries members of CENELEC, the minimum value is 250 000 automatic cycles. In Canada, China, in Japan and the USA, the minimum value is 100 000 cycles.

6.11.4 to 6.11.2 Not applicable.

**FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION**



Documents
Document Sharing Hub

6.15 According to construction

6.15.3 Not applicable

6.15.3DV D2 Modification of 6.15.3 by adding the following note:

Note: Throughout this document, in-line cords are not permitted.

6.16 Not applicable

Additional subclauses:

6.101 According to type of burner

Classification should be according to burner operation (for example, forced draught) and type of fuel (for example, gas). See 2.101.1 to 2.101.11.

6.102 According to type of pilot

6.103 According to type of ignition

6.104 According to starting fuel rate

7 Information

This clause of part 1 is applicable except as follows:

7.2.6 Replacement

Except as indicated in 7.4, for integrated systems all information is provided by means of declaration (X). For incorporated systems not declared under requirement 50, the marking required is as indicated in table 7.2. For incorporated systems declared under requirement 50, the only marking required is the manufacturer's name or trade mark and the unique type reference if other required marking is provided by documentation (D).

See the explanation of documentation (D) contained in 7.2.1.

7.2.9 Modification:

Replace " $T_{\max}$ other than 55 °C" by " $T_{\max}$ other than 60 °C" in the line for symbol for "Ambient temperature limits of switch head".

FOR UL INTERNAL REFERENCE OR CSDS USE ONLY –
NOT FOR OUTSIDE DISTRIBUTION



Documents
Document Sharing Hub