



# UL 372

## **STANDARD FOR SAFETY**

Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components

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UL Standard for Safety for Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components, UL 372

Sixth Edition, Dated July 31, 2007

### **Summary of Topics**

***This revision of UL 372 is being issued to remove the ANSI approval. No changes in requirements are involved. As noted in the Commitment for Amendments statement located on the back side of the title page, UL, CSA, and CSA America are committed to updating this harmonized standard jointly. However, the revision pages dated July 27, 2012 will not be jointly issued by UL, CSA, and CSA America, as these revision pages only address the removal of the ANSI approval from UL 372.***

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

The following table lists the future effective dates with the corresponding item.

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Future Effective Date	References
To be determined	Sixth Edition

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Canadian Standards Association  
CSA C22.2 No. 199  
Third Edition



CSA America  
ANSI Z21.20  
Fifteenth Edition



Underwriters Laboratories Inc.  
UL 372  
Sixth Edition

## Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components

July 31, 2007

(Title Page Reprinted: July 27, 2012)

Approved  
by  
Standards Council  
of Canada



## **Commitment for Amendments**

This standard is issued jointly by Canadian Standards Association (CSA), CSA America, and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA or UL at any time. Revisions to this standard will be made only after processing according to the standards development procedures of CSA and UL. CSA and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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## Preface

This ANSI Standard, ANSI Z21.20, Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components, is to be used in conjunction with the third edition of UL 60730-1A. The requirements for burner ignition systems and components are contained in this Part 2 Standard and UL 60730-1A.

This CSA Standard, CSA C22.2 No. 199, Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components, is to be used in conjunction with CAN/CSA–E60730-1. The requirements for burner ignition systems and components are contained in this Part 2 Standard and CAN/CSA–E60730-1.

This UL Standard 372, Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components, is to be used in conjunction with the third edition of UL 60730-1A. The requirements for burner ignition systems and components are contained in this Part 2 Standard and UL 60730-1A.

Requirements of this Part 2 Standard supplement or modify the requirements of UL 60730-1A and CAN/CSA–E60730-1.

Where a particular subclause of UL 60730-1A and CAN/CSA–E60730-1 is not mentioned in this Part 2 Standard, that subclause applies as far as reasonable.

**NOTE:** The following numbering system is used:

- Subclauses that are numbered starting from 101 are additional to those in Part 1.
- Those provisions throughout this publication which include uppercase "A," "B" or "C" in the numbering system are coverage included in the proposed harmonized standard which was added from ANSI Z21.20, UL 372 or UL 8730.

The text, figures and tables of IEC publication Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components, IEC 60730-2-5, copyright 2000, are used in this Standard with consent of the IEC and the American National Standards Institute (ANSI). The IEC copyrighted material has been reproduced with permission from ANSI. ANSI should be contacted regarding the reproduction of any portion of the IEC material. Copies of IEC Publication 60730-2-5 may be purchased from ANSI, 25 West 43rd Street, New York, New York, 10036, (212) 642-4900.

This is a common CSA America, Inc., CSA and UL Standard for Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components, ANSI Z21.20/CSA C22.2 No. 199/UL 372. It is the fifteenth edition of ANSI Z21.20, the third edition of CSA C22.2 No. 199, and the sixth edition of UL 372. This edition of ANSI Z21.20 supersedes the previous edition published in 2005. This edition of CSA C22.2 No. 199 supersedes the previous edition published in 1989. This edition of UL 372 supersedes the previous edition published in 1994.

Although the CSA and UL standards contain identical requirements, and identical publication dates, the presentation and format of the standards material may differ between the two published standards.

This common Standard was prepared by CSA America, Inc., CSA and Underwriters Laboratories (UL).

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

**NOTE:** Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

### **Level of harmonization**

This standard is based on IEC 60730-2-5:2000 and its sections and annexes are numbered similarly to that IEC standard but it shall not be considered as equivalent to this IEC Standard. Therefore, while it is based on that IEC standard, it is not an adoption of it.

This Standard is published as an equivalent standard for CSA America, Inc., CSA and UL. An equivalent standard is a standard that is the same in technical content, except as follows. Technical national differences are allowed for national differences resulting in conflicts in codes and government regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructure factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

### **Interpretations**

The interpretation by the standards development organization of an equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

### **CSA Effective Date**

The effective date for CSA will be announced through CSA Informs or a CSA certification notice.

### **UL Effective Date**

The previous effective date (July 31, 2012) for UL 372 has been suspended. The effective date is to be determined.

## 1 Scope and normative references

This clause of part 1 is applicable except as follows:

### 1.1 *Replacement:*

This standard modifies or amends the requirements of the Part 1 standard. In Canada the Part 1 standard applicable is CAN/CSA E60730-1, Automatic electrical controls for household and similar use – Part 1: General Requirements, and in the U.S. the Part 1 standard applicable is UL 60730-1A , Automatic electrical controls for household and similar use – Part 1: General Requirements, 3rd Edition.

This standard applies to newly produced automatic burner ignition systems and system components constructed entirely of new, unused parts and materials for the automatic control of burners for one or more of the following fuels:

- oil,
- natural gas,
- manufactured gas,
- mixed gas,
- liquefied petroleum gas or,
- LP gas-air mixtures

This standard is applicable to a complete burner ignition system, a separate programming unit, an oxygen depletion safety shutoff system and components that perform one or more of the following functions:

- a) Ignite the fuel at the main burner(s), or at the pilot burner(s) so it can ignite the main burner(s);
- b) Prove the presence of either the ignition source, the main burner flame, or both;
- c) Automatically act to shut off the fuel supply to the main burner(s), or to the pilot and main burner(s), when the supervised flame or ignition source is not proved; and
- d) Automatically act to shut off the gas supply to the pilot and main burner(s), when the oxygen content of the room in which the equipment is installed is reduced below a predetermined level.

Components can be, but are not limited to: automatic controls; pilot burners, thermoelectric devices, electrodes, ignition devices, ignition sources and flame detectors.

Throughout this standard the following terms shall be abbreviated as shown below:

1. "system" means "burner ignition system."

2. "component" means "burner ignition system component."

3. "control" means "system" or "component."

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

**1.1.1 Replacement:**

This standard applies to 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 systems and components 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.

1.1.2 Replacement:

This standard applies to manual controls when such are electrically and/or mechanically integral with automatic systems.

1.1.3 Not Applicable.

1.1.4 Not Applicable.

**1.1.5A Addition:**

This standard applies to each component of an automatic burner ignition system shall be capable of operation throughout an ambient temperature range of 32°F (0°C) to 125°F (51.5°C). The manufacturer is allowed to specify temperatures below 32°F (0°C) and above 125°F (51.5°C).

a) For gas fired equipment rated 400,000 Btu/hr (117 228 W) or less,  $T_{\min}$ , and  $T_{\max}$  are as specified in 1.1.5A; and

b) For burner controls for all other equipment,  $T_{\max}$ , declared at less than 150°F (65.5°C) shall be tested at 150°F (65.5°C) or higher as specified by the manufacturer.

1.3 Not Applicable.

**1.3A Addition:**

Compliance with this Part 2 standard does not imply that such a control is acceptable for use on fuel burning appliances or equipment without supplemental test with the device(s) applied to the particular appliance or equipment design.

1.3A.1 All specifications as to construction set forth herein may be satisfied by the construction actually prescribed or such other construction as will provide at least equivalent performance.

**1.3A.2** If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated value is to be regarded as the specification.

#### 1.4 Replacement:

This standard applies also to controls incorporating electronic devices, requirements for which are contained in annex H, Requirements for electronic systems and components.

#### 1.5 *Addition:*

##### 1.5.1 Normative references

The following normative reference documents contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid international Standards.

**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.*

**CAN/CSA E384-14-1-95 (R2004)**  
*Fixed Capacitors in Electronic Equipment – Part 14: Blank Detail Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains.*

**CAN/CSA E60730-02**  
*Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements,*

**CSA B 149.1-05**  
*Natural Gas and Propane Installation Code.*

**CSA C22.1-06**  
*Canadian Electrical Code, Part 1.*

**CSA C22.2 No. 0.15-01**  
*Adhesive Labels.*

**CSA C22.2 No. 0.17-00 (R2004)**  
*Evaluation of Properties of Polymeric Materials.*

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

**CSA C22.2 No. 13-1962 (R2001)**  
*Transformers for Luminous-Tube Signs, Oil- and Gas-Burner Ignition Equipment, Cold-Cathode Interior Lighting.*

**CSA C22.2 No. 49-98 (R2003)**  
*Flexible Cords and Cables.*

**CSA C22.2 No. 65-03**  
*Wire Connectors.*

**CSA C22.2 No. 66-1988 (R2001)**  
*Specialty Transformers.*

**CSA C22.2 No. 94-M91 (R2001)**  
*Specialty Purpose Enclosures.*

**CSA C22.2 No. 127-99 (R2004)**  
*Equipment and Lead Wires.*

**CSA C22.2 No. 153-M1981 (R2003)**  
*Quick-Connect Terminals.*

**CSA C22.2 No. 158-1987 (R2004)**  
*Terminal Blocks.*

**CSA C22.2 No. 248.1-00 (R2005)**  
*Low-Voltage Fuses – Part 1: General Requirements.*

**CAN/CSA-C22.2 No. 60065-03**  
*Audio, video and similar electronic apparatus – Safety Requirements.*

**IEC 60068-2-6: 1995-03**  
*Environmental testing – Part 2: Test Fc: Vibration (sinusoidal).*

**IEC 60068-2-75: 1997-08**  
*Environmental testing – Part 2-75: Test Eh: Hammer tests.*

**IEC 60085: 2004-06**  
*Electrical Insulation – Thermal classification.*

**IEC 60127-1: 2003-02**  
*Miniature Fuses – Part 1: Definitions for Miniature Fuses and General Requirements for Miniature Fuse-links.*

**IEC 60264-1: 2005-04**  
*Low-voltage Fuses – Part 1: General Requirements.*

**CAN/CSA-E60335-1/4-03**

*Household and similar electrical appliances, Safety – Part 1: General Requirements.*

**CAN/CSA-E60384-14-95 (R2004)**

*Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains.*

**IEC 61000-4-2: 2000-04**

*Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test.*

**IEC 61000-4-3: 2002-09**

*Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.*

**IEC 61000-4-4: 1995-01**

*Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient burst immunity test.*

**IEC 61558-2-4: 1997-03**

*Safety of power transformers, power supply units and similar – Part 2: Particular requirements for isolating transformers for general use.*

**NFPA 70-2005,**

*National Electrical Code.*

**UL 50-1995**

*Enclosures for Electrical Equipment.*

**UL 248-1-2000**

*Low-Voltage Fuses.*

**UL 486A-1997**

*Wire Connectors and Soldering Lugs for Use With Copper Conductors.*

**UL 506-1994**

*Specialty Transformers.*

**UL 746C-2001**

*Polymeric Materials – Use in Electrical Equipment Evaluations.*

**UL 840-1993**

*Standard for Safety for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment.*

**UL 969-1995**

*Marking and Labeling Systems.*

**UL 1059-2001**

*Standard for Terminal Blocks.*

**UL 1414-2000**

***Across-the-Line, Antenna-Coupling and Line-by-Pass Capacitors for Radio- and Television-Type Appliances.***

**UL 1585-1998**

***Class 2 and Class 3 Transformers.***

**UL 1998**

***Standard for Software in Programmable Components.***

**UL 60065-2003**

***Standard for Audio, video and similar electronic apparatus – Safety requirements.***

**UL 60335-1-2004**

***Household and similar electrical appliances – Safety – Part 1: General requirements.***

**UL 60730-1A-2002**

***Standard for Safety for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements.***

**2 Definitions**

*This clause of Part 1 is applicable except as follows.*

The following definitions apply for the purpose of this standard and may or may not be consistent with definitions used in other standards. Where the terms "VOLTAGE" and "CURRENT" are used, they imply r.m.s. values unless otherwise specified.

(See Appendix A for alphabetic listing of definitions.)

**2.1 Definitions relating to ratings, voltages, currents and wattages****2.1.5A Addition:**

**CIRCUIT HIGH VOLTAGE:** A circuit involving a potential of not more than 600 volts and having circuit characteristics in excess of those of an extra-low voltage or an isolated limited secondary circuit.

**2.1.14A Addition:**

**HIGH TENSION CIRCUIT:** An ignition circuit involving a potential of more than 600 volts supplied by a step-up transformer or by a suitable combination of devices which will increase high voltage to over 600 volts.

**2.1.15A Addition:**

**EARTHING:** Connected with an electrical ground; sometimes referred to as "GROUNDING."

**2.1.16A Addition:**

**BONDED:** Permanently and reliably connected to an earthing terminal.

**2.1.17A Addition:**

GROUNDING: See 2.1.15A.

**2.2 Definitions of types of control according to purpose**

2.2.1 ELECTRICAL CONTROL: Device used in, on or in association with an equipment for the purpose of varying or modifying the output from such equipment, and which embodies the aspects of initiation, transmission and operation. At least one of these aspects shall be electrical or electronic.

2.2.9 Void

2.2.10 Not Applicable.

2.2.11 Not Applicable.

2.2.12 ELECTRICALLY OPERATED CONTROL: Control in which the transmission is effected by an electrical prime mover and in which the operation controls an electric circuit, and is without intentional significant time-delay.

An example is a relay.

2.2.13 through 2.2.18 Not Applicable.

Addition:

2.2.101 BURNER CONTROL SYSTEM: A system which monitors the operation of fuel burners. It includes a programming unit and a flame detector, and may include an ignition source or ignition device.

The various functions of an automatic burner control system may be in more than one housing.

**2.2.101.1A Addition:**

**BURNER IGNITION SYSTEM: A system which includes all the components necessary to perform the following functions:**

- a) Ignite the fuel at the main burner(s), or at the pilot burner(s) so it can ignite the main burner(s);
- b) Prove the presence of either the ignition source, the main burner flame, or both; and
- c) Automatically act to shut off the fuel supply to the main burner(s), or to the pilot and main burner(s), when the supervised flame or ignition source is not proved.

The various functions of a burner ignition system may be in more than one housing.

**2.2.101.2A Addition:**

**BURNER IGNITION SYSTEM COMPONENT: A component which performs one or more of the functions of a burner ignition system.**

**Examples are pilot burners, electrodes, thermoelectric devices, ignition devices, ignition sources, flame detectors and flame sensors.**

2.2.102 **FLAME DETECTOR:** A 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:** A device which senses the flame and provides the input signal to the flame detector.

Examples are optical sensors and flame electrodes (flame rods).

2.2.104 **IGNITION SOURCE:** An electrical or electronic 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 tension circuits.

2.2.105 **IGNITION DEVICE:** A 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:** A device which controls the burner operation in a declared sequence from start-up to shutdown, and in response to signals from regulating, limiting and monitoring devices.

2.2.107 **MULTITRY BURNER CONTROL SYSTEM:** A system that allows more than one valve open period during its declared operating sequence.

### **2.3 Definitions relating to the function of controls**

2.3.1 **INITIATION:** Alteration to that aspect of a control which is required to produce transmission and operation.

2.3.2 **TRANSMISSION:** Essential coupling between initiation and operation which is required to enable control to fulfill its purpose.

2.3.3 **OPERATION:** Change in that aspect of a control which modifies the input to the equipment or part of the equipment.

2.3.4 **AUTOMATIC ACTION:** That action of a control in which the transmission and operation are produced by initiation which is not the result of actuation.

2.3.5 Not Applicable

2.3.6 **MANUAL ACTION:** That action of a control in which the transmission and operation are produced by initiation which is the result of actuation.

2.3.7 **ACTUATION:** Movement of the actuating member of the control by physical contact of the user.

2.3.8 and 2.3.9 Not Applicable.

2.3.11 Not Applicable.

2.3.13 OPERATING SEQUENCE: Intended sequence, order or pattern in which the operation of the electrical or mechanical functions occur as a result of either an automatic or a manual action.

2.3.14 and 2.3.15 Not Applicable.

2.3.17 SETTING: Mechanical positioning of a part of a control in order to select an operating value.

2.3.22 and 2.3.23 Not Applicable.

2.3.26 through 2.3.28 Not Applicable.

2.3.30  $T_{MAX}$ : The declared maximum continuous ambient temperature to which the system is intended to be exposed during normal operation.

**2.3.30A Addition:**

**$T_{MIN}$ : The declared minimum continuous ambient temperature to which the system is intended to be exposed during normal operation.**

2.3.101 AUTOMATIC RECYCLING: The automatic repetition of the start-up procedure, without manual intervention, following loss of the supervised flame and subsequent-fuel supply shut off.

2.3.102 CONTROLLED SHUTDOWN: The 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.

2.3.103 FLAME DETECTOR RESPONSE TIME: The 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:

2.3.104.1 SIGNAL FOR PRESENCE OF FLAME ( $S_1$ ): The minimum signal which indicates the presence of flame when there was previously no flame.

2.3.104.2 SIGNAL FOR ABSENCE OF FLAME ( $S_2$ ): The maximum signal which indicates the loss of flame.  $S_2$  is less than  $S_1$ .

2.3.104.3 MAXIMUM FLAME SIGNAL ( $S_{MAX}$ ): The maximum signal which does not affect the timings or the sequence.

2.3.104.4 Not Applicable.

2.3.105 SELF-CHECKING FLAME DETECTOR: A 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: The 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: The period of time between the signal indicating absence of flame and lock-out.

2.3.108 **FLAME FAILURE REIGNITION TIME (RELIGHT TIME):** The 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.

**2.3.108A Addition:**

**FLAME FAILURE RESPONSE TIME:** The period of time between loss of supervised ignition source or the supervised main burner flame and the action to shut off the fuel supply.

2.3.109 **FLAME SIGNAL:** The output signal of the flame detector.

2.3.110 **FLAME SIMULATION:** A condition which occurs when the flame detector indicates the presence of flame when in reality no flame is present.

2.3.111 Not Applicable.

2.3.112 **LOCK-OUT:**

2.3.112.1 **NON-VOLATILE LOCK-OUT:** The condition of a control following safety shutdown such that a restart can only be accomplished by a manual reset and by no other cause.

2.3.112.2 **VOLATILE LOCK-OUT:** The condition of a control following safety shutdown such that a restart can be accomplished by either a manual reset or by an interruption of the power supply and its subsequent restoration.

**2.3.112.3A Addition:**

**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.

**2.3.112.4A Addition:**

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

**2.3.113A Addition:**

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

2.3.115 **POST IGNITION TIME:** That period of time between the signal indicating presence of flame and the signal to de-energize the ignition device.

2.3.116 **PRE-IGNITION TIME:** That period of time between the signal to energize the ignition source and the signal to energize the fuel flow means.

2.3.117 **PROVED IGNITER SYSTEM:** A system in which the fuel flow means is energized only after the availability of sufficient electrical energy to ignite the fuel has been verified.

An example is a system using proved hot surface igniters.

2.3.117.1 **PROVED IGNITER OPERATING VALUE:** The signal which indicates that the proved igniter is capable of igniting the fuel.

2.3.117.2 **IGNITER PROVING TIME:** The 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:** The 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:** The period of time during which air is mechanically introduced to displace any remaining air/fuel mixtures or products of combustion from the combustion zone and flue ways.

2.3.118.1 **POST-PURGE TIME:** The purge time that takes place immediately following the shutting off of the fuel supply at the completion of an operating cycle.

2.3.118.2 **PRE-PURGE TIME:** The purge time that takes place between initiation of a system sequence and the action to energize the ignition means.

**2.3.118.3A Addition:**

**INTER-PURGE TIME:** On a multity 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 **REIGNITION (RELIGHT):** The 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:** The 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.

2.3.122 **SAFETY SHUTDOWN:** The deenergization of the main fuel flow means as the result of abnormal operating conditions or the detection of an internal fault of the system.

Examples of abnormal operating conditions include power interruption, fuel interruption, or conditions which cause action of a limiting control, etc.

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, e.g., from a thermostat, which releases the system from its start position.

**2.3.125A Addition:**

**LOCK-OUT TIME:** The period of time between energizing the system and lockout if proof of the supervised main ignition source or the supervised main burner flame is not established.

**2.3.126A Addition:**

**WAITING TIME:**

- a) The period between the start signal and the action to energize the ignition means; or;
- b) The period between the end of a trial for ignition period and the reactivation of the ignition means if proof of the supervised flame is not established.

Waiting time is normally provided for burners where air for combustion is not mechanically introduced, but may require time for natural ventilation of the combustion chamber and flue passages before energizing the ignition means.

2.3.127 Not Applicable.

2.3.128 **VALVE SEQUENCE PERIOD:** For multitry systems, the sum valve open periods prior to lock-out, if proof of the supervised burner flame is not established.

**2.3.129A Addition:**

**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.

**2.3.130A Addition:**

**AUTOMATIC RESTART TIME:** The period of time between a soft lockout and the automatic action to initiate another ignition sequence.

**2.3.131A Addition:**

**SAFE START CHECK:** an action during each start-up sequence, where the system shall check for a flame signal before any fuel valve is energized. If a flame signal occurs, the system shall either:

- a) not initiate the next step of the start-up sequence; or
- b) proceed to safety shutdown.

## 2.4 Definitions relating to disconnection and interruption

2.4.5 and 2.4.6 Not Applicable.

## 2.5 Definitions of types of control according to construction

2.5.3 through 2.5.6 Not Applicable.

### 2.5.12A Addition:

**ELECTRO-MECHANICAL CONTROL:** An electrical control which incorporates at least one electrically operated mechanical device or a mechanically operated device which controls an electrical circuit.

2.6 Not Applicable.

## 2.7 Definitions relating to protection against electric shock

2.7.1.1 Not Applicable.

2.7.2 and 2.7.3 Not Applicable.

2.7.8 **ACCESSIBLE PART OR SURFACE:** Part or surface which can be touched by the test finger of figure 2A, when the control is mounted as in normal use, and after detachable parts have been removed.

## 2.8 Definitions relating to component parts of controls

2.8.1 Not Applicable.

2.8.5 Not Applicable.

2.8.7 Not Applicable.

## 2.9 Definitions of types of terminals and terminations of controls

2.9.9 Not Applicable.

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## 2.10 Definitions relating to the connections to controls

2.10.5 and 2.10.6 Not Applicable.

2.11 Not Applicable.

## 2.13 Miscellaneous definitions

### 2.13.8A Addition:

**CHEESECLOTH:** Bleached cheesecloth 36 inches (914 mm) wide, running 14 – 15 yards per pound mass (approximately 28 – 30 m/kg mass) and having a count of  $32 \times 28$  – that is, for any square inch, 32 threads in one direction and 28 threads in the other direction (for any square centimeter, 13 threads in one direction and 11 threads in the other direction).

### 2.13.9A Addition:

**NORMAL BUTANE (N-BUTANE), TECHNICAL GRADE:** A liquefied petroleum gas composed of a minimum of 95 percent n-butane ( $C_4H_{10}$ ) which may contain other impurities such as isobutane, butylenes and propane not in excess of 5 percent.

**PROPANE HD-5:** A special grade of liquefied petroleum gas composed of a minimum of 90 percent liquid volume of propane ( $C_3H_8$ ) and a maximum of 5 percent liquid volume of propylene ( $C_3H_6$ ).

2.15 through 2.19 Not Applicable.

## 2.101 Definitions relating to the type of burner ignition

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:** A 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:** A 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.