

Australian Standard[®]

Electronic flame safeguards and flame detectors



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- Appliance and Component Testing
 - Association of Accredited Certification Bodies
 - Energy Networks Association
 - Engineers Australia
 - Gas Appliance Manufacturers Association of Australia
 - Gas Appliances and Services Association
 - Gas Technical Regulators Committee
 - LPG Australia
-

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STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 4625—2008

Electronic flame safeguards and flame detectors

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Technical Committee AG-013 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

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NOTES

Australian Standard[®]

Electronic flame safeguards and flame detectors

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PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee AG-013, Components Used for Gas Appliances and Equipment, to supersede AS 4625—2004. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to retain this Standard as an Australian Standard rather than develop it as an Australian/New Zealand Standard.

The objective of this Standard is to provide manufacturers, designers, regulatory authorities, testing laboratories and similar organizations with uniform minimum requirements for the safety, performance and use of combination controls for electronic flame safeguards and flame detectors.

This Standard should not be regarded as a design specification or as an instruction manual.

In its preparation, consideration has been given to—

- (a) continuity of satisfactory operation;
- (b) the prevention of fire hazards, and explosions;
- (c) the prevention of injury to persons or property;
- (d) gas rules and regulations now in force; and
- (e) relevant International Standards.

The revision of the Standard focused on its alignment with EN 298 as it is the referenced standard for microprocessor and programmable flame safeguards. The intention was not to supersede the previous edition of AS 4625 with EN 298 but to complement and preserve the Australian local requirements. A number of new definitions were added and the classification of flame safeguards expanded to reflect the EN 298 notation and to better align with the Australian classification. In some cases, this was done to reflect and clarify what is used in the appliance application standards. Where needed, clarification of clauses and their intent was also undertaken as well as some revision of specific methods of test.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

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STANDARDS AUSTRALIA

Australian Standard**Electronic flame safeguards and flame detectors**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

The requirements of this Standard apply to electronic flame safeguards and flame detectors for use on gas or multi-fuel burners.

They do not cover complete burner management systems except insofar as the flame safeguard has provision to be interlocked into the burner management system.

Compliance with these requirements does not imply acceptability for use without supplemental tests or conditions in an intended application. The relevant application Standards should be referred to for more specific requirements.

1.2 REFERENCED DOCUMENTS

The following documents are referenced in this Standard:

AS	
4620	Thermoelectric flame safeguards
4622	Electrical and electronic ignition devices for gas appliances
EN	
298	Automatic gas burner control systems for gas burners and gas burning appliances with or without fans

1.3 DEFINITIONS**1.3.1 Atmospheric burner**

A burner where all the air for combustion is provided at atmospheric pressure and is introduced by inspirating effect of an injector and/or by the natural draught in the combustion chamber.

1.3.2 Authority

Means the authority having jurisdiction or such authority as delegated. (See Technical regulator, Clause 1.3.5)

1.3.3 Automatic ignition

The lighting of gas at a burner without a manual operation whenever gas flows from the burner.

1.3.4 Automatic operation

The use of a sequence of operations that once initiated does not require any intermediate manual operation.

1.3.5 Automatic shut off valve

An automatic valve used to shut off gas supply to an appliance when a signal is generated indicating that a dangerous condition has developed.

1.3.6 Direct ignition device

A device which provides ignition of a burner without the use of another flame.

1.3.7 Electronic flame safeguard

A flame safeguard utilizing electronic components to perform its function.

1.3.8 Flame establishment period

The period which begins when the fuel valve is energized and ends when the flame supervision system is first required to supervise that flame.

1.3.9 Flame failure response time

The time taken for the flame safeguard to detect loss of flame and de-energize the shut off valve.

1.3.10 Flame proving period

The supervised period following the flame establishment period and before any further operation other than shutdown is permitted.

1.3.11 Flame safeguard

A safety device that automatically cuts off the gas supply if the actuating flame is extinguished.

1.3.12 Flame safeguard system

A system consisting of a flame detector(s) plus associated circuitry, integral components, valves and interlocks, the function of which is to shut off the fuel supply to the burner(s) in the event of ignition failure or flame failure.

1.3.13 Interlock

A device or function that ensures that the operation of items of equipment is dependent upon the fulfilment of predetermined conditions by other items of equipment.

1.3.14 Intermittent pilot

A pilot that is automatically ignited each time the burner is started and which is automatically extinguished with the main burner.

1.3.15 Interrupted pilot

A pilot that is automatically ignited each time the burner is started and which is automatically extinguished at the end of the main flame establishment period.

1.3.16 Lockout

A safety shutdown condition of the control system that requires a manual reset in order to restart.

1.3.16.1 Volatile lockout

Safety shutdown condition of the system, such that a restart can only be accomplished by either manual reset of the system, or an interruption of the main power and its subsequent restoration.

1.3.16.2 Non volatile lockout

Safety shutdown condition of the system, such as that a restart can only be accomplished by a manual reset of the system and by no other means.

1.3.17 Natural draught

The flow procedure by the tendency of warmed gases to rise.

1.3.18 Natural draught burner

See under Atmospheric burner (Clause 1.3.1).

1.3.19 Natural draught flue

A flue which is operated only by the buoyancy effect of the hot gases in it.

1.3.20 Pilot

A permanently located burner independent of the main burner, small in relation to it, and arranged to provide ignition for the main burner.

1.3.21 Programming flame safeguard

A flame safeguard which automatically sequences at least two burner functions such as ignition spark, gas valve, etc.

1.3.22 Purge

The force or induced introduction of the air through the combustion chamber and flue passages in order to displace any remaining fuel/air mixture and/or products of combustion.

1.3.23 Pre-purge

The purge that takes place between the start signal and the energization of the ignition device.

1.3.24 Safety shutdown

The immediate action of shutting off all gas and ignition energy by means of a safety control such that restart cannot be accomplished without a full start cycle.

1.3.25 Technical regulator

The Government appointed person, body or authority that has jurisdiction over gas safety legislation (or other entity authorized by that person, body or authority).

1.3.26 Valve

A device for the purpose of controlling or shutting off flow.

1.3.27 Waiting time

For atmospheric burners (i.e. without fans) this is the interval between the start signal being given and the energization of the ignition device. During this time natural ventilation of the combustion chamber and the flue passages may take place.

1.4 GENERAL REQUIREMENTS

Attention is drawn to any requirements of appropriate electrical authorities for flame safeguards and flame detectors.

Where a programmable electronic system (PES) or a microprocessor-based device is employed for safety related functions of burner management systems, the system or device shall comply with the requirements of this Standard and conform to the relevant requirements of EN 298 (or equivalent).

Flame safeguards incorporating electronic igniters shall meet the requirements of both this Standard and all the appropriate requirements of AS 4622.

NOTE: Requirements for thermoelectric flame safeguards and electronic igniters are published in AS 4620 and AS 4622.

European Standard EN 298 has been identified as an appropriate Standard for the evaluation of electronic flame safeguards and flame detectors. Compliance with EN 298 will also be deemed to comply with the requirements of this Standard. However, specific local requirements as specified in this Standard shall take precedence.

NOTE: Refer to Appendix I, which details equivalent European classification codes.

1.5 CLASSIFICATION

1.5.1 Class

The flame safeguard may be one of three classes:

- (a) *Class 1* Has a safe start check and a continual self-check of the flame safeguard and flame detector.
- (b) *Class 2* Has a safe start check of the flame safeguard and flame detector.
- (c) *Class 3* Has no safe start check or continual self-check of the flame safeguard or flame detector.

1.5.2 Type

Class 1 and Class 2 flame safeguards shall be one of the following:

- (a) A Programming without reignition—rigorous timings (5 s or less main flame establishment period).
- (b) B Programming without reignition—less rigorous timings (greater than 5 s main flame establishment period).
- (c) Ca Programming with single reignition—rigorous timings (5 s or less main flame establishment period).
- (d) Cb Programming with multiple reignition—less rigorous timings (greater than 5 s main flame establishment period).
- (e) D Non-programming.

The essential features of Class 1 and Class 2 flame safeguards are set out in Table 1.1. The Class 1 and 2 classifications of this Standard and the equivalent classifications of EN 298 are listed in Table I1 in Appendix I.

NOTE: The classification has been provided to assist users in the selection of a unit appropriate for the application.

Class 3 flame safeguards are limited to Type D non-programming.

TABLE 1.1
FEATURES OF CLASSES 1, 2 AND 3 FLAME SAFEGUARDS

Class	1A	2A	1Ca	2Ca	1B	2B	1Cb	2Cb	1D	2D	3D
Safe start check	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Continual self-check	Y		Y		Y		Y		Y		
Rigorous timings	Y	Y	Y	Y							
Less rigorous timings					Y	Y	Y	Y			
Reignition—single try			Y	Y							
Reignition—multiple try							Y	Y			
Forced/induced purge	Y ¹	Y	Y	Y	Y ¹	Y ¹	Y	Y			
Airflow interlock	Y ¹	Y	Y	Y	Y ¹	Y ¹	Y ¹	Y ¹			
Waiting time					Y ¹	Y ¹	Y	Y			
Volatile lockout					Y	Y	Y	Y			
Non volatile lockout	Y	Y	Y	Y	Y ¹	Y ¹	Y ¹	Y ¹			

¹ These are optional features that may be included in the device.

1.5.3 Flame safeguards for particular applications

1.5.3.1 Class 3 flame safeguard

The basic flame safeguard is a Class 3D that changes over one or more sets of contacts whenever a flame is detected. It is primarily intended for use in manual systems or as an addition to a programming unit to supervise an additional flame. Any safe start checks required by appliance codes or any programming functions are provided by external circuitry.

1.5.3.2 Class 2 flame safeguard

The majority of flame safeguard applications will require a Class 2 unit of one of the following types:

- (a) Class 2A units provide timings that are acceptable for most applications. However, units should still be checked for any other features required for a particular application and for any duty limits recommended by the manufacturer.
- (b) Class 2B units are suitable only for applications where the longer flame establishment times and limited proving periods may be permitted.
- (c) Class 2C units are provided with a reignition attempt after flame failure. Sub-type (a) has timings similar to Class 2A units and sub-type (b) has timings similar to Class 2B units.
- (d) Class 2D units are similar to the basic Class 3D units except that a safe start check is included.

1.5.3.3 Class 1 flame safeguard

Class 1 units are similar to their Class 2 counterparts except that they automatically check the correct operation of the unit at regular intervals whilst in use, thus providing additional safety against fault conditions. This feature is particularly relevant where appliances operate for extended periods without shutdown.

SECTION 2 CONSTRUCTION AND DESIGN

2.1 MATERIALS

2.1.1 Continuity of satisfactory operation

Materials used in the construction of a flame safeguard and flame detector shall be such that continuity of satisfactory operation can be expected during normal usage within the manufacturer's specification.

2.1.2 Suitability of materials for conditions of use

Materials and finishes used in the construction of a flame safeguard and flame detector shall be suitable for the conditions of use as specified by the manufacturers.

2.2 CONSTRUCTION

2.2.1 Continuity of satisfactory operation

Construction shall ensure the continued safe operation of the unit during usage within the manufacturer's specification.

2.2.2 Accidental displacement of parts

Every part shall be secure against accidental displacement and shall be constructed to maintain a fixed relationship between essential parts under normal and reasonable conditions of handling and usage so as to ensure continued compliance with their approval requirements.

2.2.3 Sharp edges

Constituent parts shall be free from sharp edges that may cause damage or injury.

2.2.4 Prevention of accidental shift after calibration

Means provided for factory calibration shall be factory sealed to prevent accidental shifting after calibration.

2.2.5 Mounting

Provision shall be made for securely mounting a flame safeguard and flame detector in position. Bolts or screws used for mounting shall be independent of the method for securing parts of the flame safeguard or flame detector to its frame or base.

2.2.6 Enclosure of the mechanism

The mechanism of a flame safeguard and flame detector shall be protected by an enclosure to avoid damage to or interference with operating parts.

2.2.7 Location or enclosure of electrical parts

Electrical parts shall be located or enclosed so that protection against accidental contact or shorting of live parts shall be prevented.

2.2.8 Limiting of adjustments

If a flame safeguard or flame detector is adjustable in the field, stops or equivalent means shall be provided for limiting the adjustments to values within those required by Section 3.