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UL 2106

**STANDARD FOR SAFETY**

Field Erected Boiler Assemblies

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UL Standard for Safety for Field Erected Boiler Assemblies, UL 2106

Second Edition, Dated April 18, 2006

### **Summary of Topics**

***This revision to UL 2106 is being issued to remove the reference to the withdrawal date of UL 873 and to address universal upkeep of UL Standards for Safety. These revisions are considered to be non-substantive and not subject to UL's STP process.***

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1

**UL 2106**

**Standard for Field Erected Boiler Assemblies**

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**Second Edition**

**April 18, 2006**

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Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

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## CONTENTS

### INTRODUCTION

|                                |   |
|--------------------------------|---|
| 1 Scope .....                  | 5 |
| 2 General .....                | 6 |
| 2.1 Terminology .....          | 6 |
| 2.2 Units of measurement ..... | 6 |
| 3 Glossary .....               | 6 |
| 4 Components .....             | 9 |

### CONSTRUCTION – MECHANICAL

|   |    |
|---|----|
| 5 Assembly .....  | 10 |
| 5.1 General .....                                       | 10 |
| 5.2 Moving parts .....                                  | 11 |
| 6 Servicing .....                                       | 12 |
| 7 Casing .....  | 13 |
| 8 Radiation Shields or Liners .....                     | 13 |
| 9 Combustion Chamber .....                              | 14 |
| 10 Baffles .....  | 14 |
| 11 Flue Collar .....                                    | 14 |
| 12 Damper and Draft Regulator .....                     | 14 |
| 13 Installation of External Controls and Fittings ..... | 15 |
| 14 Field Wiring System Connection .....                 | 16 |

### CONSTRUCTION – ELECTRICAL

|  |    |
|--|----|
| 15 Controls .....  | 16 |
| 15.1 Application .....   | 16 |
| 15.2 Limit control .....   | 17 |
| 15.3 Primary safety control .....  | 18 |
| 15.4 Liquid level limit controls .....                                     | 18 |
| 15.5 Temperature limit controls .....                                      | 19 |
| 15.6 Purge and combustion air monitoring controls .....                    | 19 |
| 16 Field Wiring .....  | 19 |
| 16.1 General .....   | 19 |
| 16.2 Leads and terminals .....   | 21 |
| 17 Internal Wiring .....   | 23 |
| 17.1 General .....   | 23 |
| 17.2 Methods .....   | 23 |
| 17.3 Short-circuit protection .....  | 26 |
| 18 Separation of Circuits .....  | 27 |
| 19 Bonding for Grounding .....   | 28 |
| 20 Servicing and Adjustment .....  | 31 |
| 21 Electrical Components .....   | 32 |
| 22 Mounting of Electrical Components .....                                 | 32 |
| 23 Electrical Enclosures .....   | 33 |
| 23.1 General .....   | 33 |
| 23.2 Doors and covers .....  | 36 |
| 24 Motors and Motor Overload Protection .....                              | 37 |
| 25 Overcurrent Protection of High-Voltage Control-Circuit Conductors ..... | 42 |

|   |  |    |
|---|--|----|
| 25.1  | General  | 42 |
| 25.2  | Direct-connected high-voltage control circuit                | 42 |
| 25.3  | Tapped high-voltage control circuits                         | 42 |
| 25.4  | Overcurrent-protective devices                               | 43 |
| 26  | Overcurrent Protection of Transformers                       | 44 |
| 26.1  | High-voltage transformers                                    | 44 |
| 26.2  | Low-voltage transformers                                     | 45 |
| 27  | Switches and Controllers                                     | 46 |
| 28  | Capacitors   | 46 |
| 29  | Electrical Insulating Material                               | 47 |
| 30  | Spacings – High-Voltage Circuits                             | 47 |
| 31  | Spacings – Low-Voltage Circuits                              | 49 |
| 32  | Accessibility of Uninsulated Live Parts and Film-Coated Wire | 49 |
| 32.1  | General  | 49 |
| 32.2  | Boilers having an input in excess of 400,000 Btu/h           | 52 |
| 32.3  | Boilers having an input of 400,000 Btu/h or less             | 55 |
| <br><b>PERFORMANCE</b>                        |  |    |
| 33  | General  | 58 |
| 34  | Dielectric Voltage-Withstand Test                            | 59 |
| <br><b>MANUFACTURING AND PRODUCTION TESTS</b> |  |    |
| 35  | General  | 59 |
| <br><b>MARKING</b>                            |  |    |
| 36  | General  | 60 |
| <br><b>INSTRUCTIONS</b>                       |  |    |
| 37  | Operating and Installation Instructions                      | 63 |
| <br><b>APPENDIX A</b>                         |  |    |
|   | Standards for Components                                     | A1 |

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## INTRODUCTION

### 1 Scope

1.1 These requirements apply to field assembled boiler assemblies that are provided with or are intended for installation with single fuel-gas, single fuel-oil, or combination gas-oil burning equipment.

1.2 These requirements apply to fuel burning equipment which require flame failure and other safeguards and which are intended primarily for commercial and industrial installation.

1.3 Equipment covered by these requirements may be operated without a competent attendant being constantly on duty at the equipment while the burners are in operation.

1.4 The appliance shall be suitable for installation in accordance with the Standards for Installation of Oil-Burning Equipment, NFPA 31, and/or National Fuel Gas Code, NFPA 54, and the National Electrical Code, NFPA 70-1993.

1.5 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

1.6 Equipment covered by these requirements shall be designed, assembled, tested, and inspected in accordance with the requirements of Section I or Section IV of the ASME Boiler and Pressure Vessel Code. Conformance with the code will be determined by application of the "H or "S " stamp and, if applicable the "A " symbol stamp on the appropriate part of the boiler assembly.

1.7 Each field erected boiler shall undergo a final inspection following completion of field assembly, ASME code required testing and inspection, and operational testing. The inspection shall cover all points required by the authority having jurisdiction.

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## 2 General

### 2.1 Terminology

2.1.1 The term "appliance" or "boiler assembly" refers to any equipment covered by this Standard.

2.1.2 The terms "combustible" and "noncombustible" as used in these requirements, are defined in the Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances, ANSI/NFPA 97M-1988.

### 2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

## 3 Glossary

3.1 For the purpose of this Standard the following definitions apply.

3.2 APPLIANCE FLUE – The flue passages within the appliance.

3.3 BAFFLE – An object placed in an appliance to direct the flow of air or flue gases.

3.4 BOILER – A closed vessel in which water or some other liquid is heated or in which steam is generated or superheated, under pressure or vacuum, by direct application of heat.

3.5 BOILER ASSEMBLY – A boiler assembly as defined herein equipped with one or more burners of either the oil or gas type, and all necessary safety controls, electrical equipment as needed, and related equipment, manufactured for assembly as a unit.

3.6 BOILER, HIGH PRESSURE STEAM – A boiler in which steam is generated at a pressure higher than 15 psig (103 kPa gauge).

3.7 BOILER, HIGH TEMPERATURE WATER – A boiler intended for operation at a pressure exceeding 160 psig (1103 kPa gauge) or at a temperature exceeding 250°F (121°C) or both.

3.8 BOILER, HOT WATER – A boiler that furnishes hot water at a pressure not exceeding 160 psig (1103 kPa gauge) and at a temperature not exceeding 250°F (121°C).

3.9 BOILER, LOW PRESSURE STEAM – A boiler in which steam is generated at a pressure not exceeding 15 psig (103 kPa gauge).

3.10 CASING – An enclosure forming the outside of the appliance, no parts of which are likely to be subjected to intense heat.

3.11 COMBUSTIBLE MATERIAL – Combustible material as pertaining to materials adjacent to or in contact with heat-producing appliances, chimney connectors and vent connectors, steam and hot water pipes, refers to material made of or surfaced with wood, compressed paper, plant fibers, or other material that will ignite and burn. Such material shall be considered as combustible even through flameproofed, fire-retardant treated, or plastered.

3.12 COMBUSTION CHAMBER – The portion of an appliance within which combustion occurs.

3.13 CONTROL, LIMIT – An automatic safety control, responsive to changes in liquid level, pressure, or temperature, for limiting the operation of the controlled equipment.

3.14 CONTROL, SAFETY – Automatic controls, including relays, switches, and other auxiliary equipment used in conjunction therewith to form a safety control system, that is intended to reduce the risk of fire, electric shock, or injury to persons during operation of the controlled equipment.

3.15 CONTROL, PRIMARY SAFETY – An automatic control that monitors the operation of a gas-fired or an oil-fired burner. It normally consists of the following sections that may be integrated into a common unit or may be separate units, interconnected by wiring:

- a) Programming Unit – A device that programs the burner through start-up and shutdown operations in response to signals from regulating, limiting, and monitoring devices. It also provides the necessary timings, in proper sequence, for purging, pilot flame ignition, main flame ignition, and in case of ignition or flame failure, for safety shutdown (lockout).
- b) Combustion Detector – A device that is responsive to flame properties. It monitors the flame at the point of flame supervision and transmits a signal to the programming unit, indicating absence or presence of flame.

3.16 CONTROL, SAFETY COMBUSTION – A primary safety control responsive directly to flame properties, sensing the presence of flame and causing fuel to be shut off in event of flame failure.

3.17 DAMPER – A valve or plate for regulating draft or flow of flue gases. A damper is generally considered as being located on the downstream side of the combustion chamber, usually in a flue passage of the appliance or in the chimney connector.

3.18 DAMPER, AUTOMATICALLY OPERATED – A damper operated by an automatic control.

3.19 DAMPER, MANUALLY OPERATED – An adjustable damper manually set and locked in the desired position.

3.20 DRAFT – The differential in static pressure available, between any two locations, to provide the energy potential for the moving of air for combustion or products of combustion through a fuel-burning heat-exchanging apparatus, or both.

3.21 DRAFT REGULATOR – A device which functions to maintain a desired draft in the appliance by automatically reducing the chimney draft to the desired value.

3.22 ELECTRICAL CIRCUITS:

a) High-Voltage Circuit – A circuit involving a potential of not more than 600 volts and having circuit characteristics in excess of those of a low-voltage circuit.

b) Low-Voltage Circuit – A circuit involving a potential of not more than 30 volts alternating-current (42.4 volts peak) or direct current and supplied by:

- 1) A Class 2 transformer, or by a battery, by a battery and fixed impedance, or by a transformer and fixed impedance each of which, as a unit is in compliance with what is required for a Class 2 transformer, or

2) Is limited to a maximum of 100 volt-amperes.

A circuit derived from a source of supply classified as a high-voltage circuit, by connecting resistance in series with the supply circuit as a means of limiting the voltage and current, is not considered to be a low-voltage circuit.

c) Safety Control Circuit – A circuit involving one or more safety controls.

3.23 FLUE – A general term for the conduit or passageway through which flue gases pass from the combustion chamber to the outside air.

3.24 FLUE COLLAR – That portion of an appliance designed for attachment of the chimney or vent connector.

3.25 FLUE GASES – Combustion products and excess air.

3.26 HEAT EXCHANGER, DIRECT – A heat exchanger in which heat generated in the combustion chamber of the appliance is transferred direct through walls of the appliance to the heating medium (such as steam or water) held in close contact with the combustion chamber walls. It is a self-contained combustion and heat transfer device, hence a direct heat exchanger.

3.27 HEAT EXCHANGER, INDIRECT – A heat exchanger which encloses or contains a heating medium, such as steam, or water, the heat from which is transferred to another heating medium separately contained in close contact with or directed through the heat exchanger.

3.28 HEATING SURFACES – All surfaces which transmit heat directly from flame or flue gases to the medium to be heated.

3.29 INDIRECT-FIRED APPLIANCE – An appliance designed so that combustion products or flue gases are not mixed in the appliance with the medium to be heated and provided with a flue collar.

3.30 NORMAL CARE – The periodic tasks usually performed to operate and maintain an appliance, such as air, fuel, pressure, and temperature regulation, cleaning, lubrication resetting of controls, etc. Repair and replacement of parts other than those expected to be renewed periodically is not considered to be normal care. Some examples of normal care are:

- a) Cleaning or replacing nozzles, atomizers, and pilots.
- b) Setting ignition electrodes.
- c) Cleaning strainers or replacing strainer or filter elements.
- d) Resetting safety control.
- e) Replacing igniter cable.

3.31 POSTPURGE PERIOD – The period of time after the fuel delivered to the burner is stopped and during which the burner motor or fan continues to run to supply air to the combustion chamber.

3.32 PREPURGE PERIOD – The period of time during the burner start-up in which air is introduced into the combustion chamber and the associated flue passages in such volume and manner as to completely replace the air or fuel-air mixture contained therein prior to initiating ignition.

3.33 RADIATION SHIELD OR LINER – A separate panel(s) interposed between heating surfaces and adjacent objects to reduce heat transmission by radiation.

3.34 READILY ACCESSIBLE – Capable of being reached easily and quickly for operation, adjustment, and inspection.

3.35 SAFETY SHUTDOWN (LOCKOUT) – The shutting off of all fuel and ignition energy to the burner by means of a safety control or controls so that restart cannot be accomplished without manual reset.

3.36 SPECIAL PARTS AND TOOLS – Those parts and tools that are not available on the open retail market.

3.37 THERMOSTAT – An automatic control actuated by temperature change to maintain temperatures between predetermined limits.

3.38 VENTED APPLIANCE – An indirect fired appliance provided with a flue collar to accommodate a chimney connector for conveying flue gases to the outside air.

#### 4 Components

4.1 Except as indicated in 4.2, a component of a product covered by this standard, including the burner and its primary safety control assembly, shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

4.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

4.3 A component shall be used in accordance with its rating established for the intended conditions of use.

4.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

## CONSTRUCTION – MECHANICAL

### 5 Assembly

#### 5.1 General

5.1.1 A field erected boiler shall include all the essential components necessary for its assembly and normal function when installed and constructed as intended. The pressure vessel shall be constructed, equipped, inspected, tested, and marked in accordance with the ANSI/ASME Boiler and Pressure Vessel Code, Section I, Power Boilers or Section IV, Heating Boilers, whichever is appropriate.

5.1.2 A boiler assembly shall be arranged in major subassemblies. See 5.1.3. Each subassembly shall be capable of being incorporated into the final assembly without requiring alteration, cutting, drilling, threading, or similar tasks by the installer. When welding is required to join major subassemblies, such welding shall be undertaken only by qualified/certified welders and the welding process shall be inspected by the local authority having jurisdiction and/or authorized inspection agency. Two or more subassemblies, which must bear a definite relationship to each other for the intended installation or operation of the boiler assembly, shall be arranged and constructed to permit them to be incorporated into the complete assembly only in the correct relationship with each other, without need for alteration or alignment, or such subassemblies shall be assembled, tested, and shipped from the factory as one element.

5.1.3 To be in accordance with 5.1.2, major subassemblies of a boiler assembly intended to be constructed in the field are considered to be the burner, (heat exchanger sections of a cast iron sectional boiler including its base,) pressure vessel, flue tubes, water tubes, combustion chamber, casing, safety controls and wiring harness.

5.1.4 A radiation shield or baffle employed to reduce the risk of excessive temperature shall be assembled as part of the boiler assembly; or be part of a subassembly that must be attached to the boiler assembly for its normal operation; or be designed so that the boiler assembly cannot be assembled for operation without first attaching a required shield or baffle in its proper position.

5.1.5 A boiler assembly shall be such that, for any normal installation, the alteration or removal of a baffle, insulation, or a radiation shield needed to reduce the risk of temperatures not intended during operation is not required.

5.1.6 A boiler assembly shall afford convenient operation by the user of those parts requiring attention or manipulation in normal usage.

5.1.7 Adjustable or movable parts shall be provided with locking devices to reduce the risk of unintentional shifting.

5.1.8 Screws or bolts used to attach parts which are detached for normal care or servicing of the appliance shall be capable of holding upon the application of the torques indicated in Table 5.1 after removal and replacement.