CERTIFICATE OF COMPLIANCE

Certificate Number	UL-CA-2228213-0
Report Reference	MH65764-20220630
Date	18-Jul-2022
Issued to:	J C ENTERPRISES 120 E 163rd St Gardena, CA 90248 United States
This is to certify that representative samples of	LGQX7 - Gas-fired Food Service Equipment and Gas-fired Equipment for Food Processing Certified for Canada See Addendum Page for Product Designation(s). Have been evaluated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	CSA CSA 1.8, 4th Ed., Issue Date: 2016-02-01
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information

This Certificate of Compliance indicates that representative samples of the product described in the certification report have met the requirements for UL certification. It does not provide authorization to apply the UL Mark. Only the Authorization Page that references the Follow-Up Services Procedure for ongoing surveillance provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

CERTIFICATE OF COMPLIANCE

Certificate Number UL-CA-2228213-0
Report Reference MH65764-20220630
Date 18-Jul-2022

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements

Model	Category Description
DKBS, DKBS-1G	Commercial Korean BBQ
DKBS, DKBS-RGC	Commercial Korean BBQ

Bruce Mahrenholz, Director North American Certification Program

UL LLC

CERTIFICATE OF COMPLIANCE

Certificate Number	UL-US-2228743-0
Report Reference	MH65764-20220630
Date	18-Jul-2022
Issued to:	J C ENTERPRISES 120 E 163rd St Gardena, CA 90248 United States
This is to certify that representative samples of	LGQX - Gas-fired Food Service Equipment and Gas-fired Equipment for Food Processing See Addendum Page for Product Designation(s). Have been evaluated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	ANSI Z83.11, 4th Ed., Issue Date: 2016-02-01
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information

This Certificate of Compliance indicates that representative samples of the product described in the certification report have met the requirements for UL certification. It does not provide authorization to apply the UL Mark. Only the Authorization Page that references the Follow-Up Services Procedure for ongoing surveillance provides authorization to apply the UL Mark.

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Bruce Mahrenholz, Director North American Certification Program

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CERTIFICATE OF COMPLIANCE

Certificate Number UL-US-2228743-0
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Model	Category Description
DKBS, DKBS-1G	Commercial Korean BBQ
DKBS, DKBS-RGC	Commercial Korean BBQ

Bruce Mahrenholz, Director North American Certification Program

UL LLC

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

APPENDIX A:

FIELD REPRESENTATIVE'S DUTIES AND INSTRUCTIONS
FOR INSPECTION OF THE PRODUCT

FIELD REPRESENTATIVE'S DUTIES:

The Field Representative's duties include, but are not limited to:

1. Examine the construction of production intended to bear the UL Mark or Marking to determine compliance with the description of the product and any other requirements expressed in this Procedure.

2. Where so specified in App. B, forward samples to UL for follow-up tests.

3. Where so specified in App. D, inspect the test records and facilities of the manufacturer to ensure that.

   a. The proper number of samples are undergoing the required inspection and tests,

   b. The required inspection and tests are being performed correctly,

   c. The proper information is being recorded and is up-to-date, and

   d. The instruments being used for the tests have been calibrated at the prescribed interval and are in good working order.

4. Report to the manufacturer and Conformity Assessment Services Department by means of a Variation Notice (VN) if:

   a. Variations in construction are found,

   b. The manufacturer's method and/or frequency of test is not as described.

   c. The records maintained by the manufacturer are not as described,

   d. The manufacturer's inspection program is not being performed as described, or

   e. Nonconforming test results are witnessed during tests conducted specifically for the Field Representative.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

f. Explain to the manufacturer that the Variation Notice is a means of communication with the manufacturer and forms a record of those items where nonconformance to the Procedure have been found.

5. When a product does not comply with the Conformity Assessment Services Procedure, require that the manufacturer either shall (1) remove any markings referencing UL from the product, (2) suitably modify all products that do not comply with the Conformity Assessment Services Procedure, or (3) hold shipment pending further instructions from Conformity Assessment Services.

In the event of a disagreement between the manufacturer and the Field Representative as to whether a product is acceptable, the manufacturer shall hold production at the factory pending resolution of the variations. The manufacturer has the right to appeal a decision with which the manufacturer disagrees and the Field Representative shall provide the name of the Conformity Assessment Services engineer to whom the appeal is to be made. Should Conformity Assessment Services grant temporary authorization for the continued use of the UL Mark, such temporary authorization shall only be for the time needed to review and/or process the Procedure revisions, or as otherwise specified to cover a particular lot or production run.

INSTRUCTIONS FOR INSPECTION OF THE PRODUCT:

At each inspection, samples of current production and/or stock shall be examined for compliance with the applicable descriptions and requirements contained in this Procedure.

In making this determination, consideration shall also be given to the following general requirements applying to the products covered by this Procedure.

Electrical Spacings – Measure minimum through air and over surface spacings when specified.

Internal Wiring – Conductors shall be routed away or protected from sharp edges and moving parts.

Security of Parts – Parts shall be secured to prevent any rotation or shifting which could result in a reduction of electrical spacings.

Markings - Information required shall be legibly marked on the product, in the manner and minimum height specified.

Accessories - Such items packaged with the product shall be specifically described in the Procedure.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

APPENDIX B:

INSTRUCTIONS TO FIELD REPRESENTATIVE FOR SAMPLE PICK-UP

RESERVED FOR FUTURE USE

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

APPENDIX C:

INSTRUCTIONS FOR FOLLOW-UP TESTS AT UL

RESERVED FOR FUTURE USE

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

APPENDIX D:

MANUFACTURER'S RESPONSIBILITIES AND REQUIREMENTS
FOR PRODUCTION AND MANUFACTURING TESTS

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GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

MANUFACTURER'S RESPONSIBILITIES

The manufacturer's responsibilities include, but are not limited to:

A. Restrict the use of markings that reference UL (either directly by the use of the name, an abbreviation of it, or the UL symbol or Recognition Mark, or indirectly by means of agreed-upon markings that are understood to indicate acceptance by UL) to those products that are found by the manufacturer's own inspection to comply with the Follow-Up Service Procedure description. Use of such markings is further limited by the agreements that have been executed by the subscriber and UL.

B. No less than once every twelve months, a completely assembled basic model shall be tested to determine satisfactory operation with respect to the Production and Manufacturing Tests detailed in App. D.

C. Determine that the test equipment is functioning properly and have it calibrated annually, or whenever it has been subject to abuse (such as being dropped or struck with an object) or its accuracy is questionable. Calibration may be by the manufacturer or an outside laboratory. In either case, it shall be by comparison with a standard that is traceable to the applicable U.S. or foreign National Standard. Certification of calibration shall be maintained by the manufacturer until the next succeeding certification, and shall be readily available for review by the UL inspector.

D. Maintain records of test performance. The records shall include the model or catalog designation of the product, the date of production, the tests performed, and the tests results. Records may consist of a statement that a lot or group was tested and the results were acceptable. The records shall be retained for 6 months and shall be readily available for review by the UL inspector.

   Exception: Records of test results need not be maintained for 100 percent production-line tests.

E. If the products are not assembled at the factory, the manufacturer is to assemble periodically a unit from production to check compatibility of the subassemblies. The components are to be capable of being readily assembled. One unit shall be checked for every 100 units produced, but not more than one for each week of production.

F. Inspect all purchased parts and/or raw materials to verify that they are in compliance with original specifications. New shipments form vendors should not be released to production until Quality Control has determined that they meet the requirements.

   Combustion chambers and heat exchangers shall be checked to determine that they are in conformance with manufacturing specifications.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

G. Test each factory assembled burner and manifold and control assembly for proper gas valve operation and verify the gas tightness of the manifold and control assembly.

H. Test each appliance to determine that electrical components function properly. This test shall be conducted on completely assembled appliances, when feasible. When not feasible, subassemblies shall be tested separately.

I. Test each completely assembled fryer to determine that the temperature limit control functions to shut off the gas supply to the main burner(s) in response to temperature rise, regardless of the source of heat.

J. Conduct dielectric withstand tests on each factory assembled appliance incorporating high-voltage electrical circuits. If the appliance employs solid-state components which can be damaged by the dielectric potential, the test may be conducted before these components are electrically connected. The tests shall consist of the application of the 60 hertz potential between high-voltage current-carrying parts and the casing, frame and similar noncurrent-carrying parts of the appliance with any switch contacts both open or closed. The potential shall be in accordance with the dielectric withstand test specified in Section E below for 1 minute, or a potential of 120 percent of that value applied for 1 second.

PRODUCTION AND MANUFACTURING TESTS:

When applicable, the following tests shall be conducted by the manufacturer on completely assembled appliances. Tests are from ANSI Z83.11/CSA 1.8, Gas Food Service Equipment.

A. BURNER OPERATING CHARACTERISTICS:

METHOD

Burners shall be operated as follows, and shall not flash back, flash out excessively, or cause damage to the appliance during ignition, expel gas out of the burner mixer face (back pressure), or cause excessive noise:

When turned on and off at normal inlet test pressure.

Tests shall be conducted with the burner(s) both hot and cold.

Expelling gases (back pressure) shall be determined by playing a flame on the mixer face (if provided) in such a manner that any gas-air mixture escaping from the mixer head would be ignited.

Basis for Acceptability

There shall be no flash back, excessive flash out, or damage to the appliance during ignition, expel gas out of the burner mixer face (back pressure), or excessive noise.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

B. IGNITION SYSTEMS AND SAFETY SHUTOFF DEVICES:

METHOD

The test shall be conducted at normal inlet test pressure.

With the appliance operating firing natural gas at normal inlet test pressure, and the appliance both hot and cold, the gas supply to the burner is to be turned on and off by means of the automatic control valve.

The ignition system is to be placed in operation with the igniter proving characteristic reduced to the minimum value specified by the control manufacturer.

Basis for Acceptability

A. Burner shall effectively ignite within 4 s.

B. There shall be no damage to the appliance or excessive flame flashout.

C. COMBUSTION:

METHOD

With all parts of the appliance at room temperature, the appliance shall be placed in operation and allowed to operate for 15 minutes at normal inlet test pressure, at which time a sample of the flue gases shall be taken.

Formulas used:

$$CO_{AF} = \frac{[\text{Ultimate Percent of } CO_2][\text{Measured Percent of CO}]}{[\text{Measured Percent of } CO_2]}$$

Ultimate Percent of CO_2 = 13.8 for Propane
Ultimate Percent of CO_2 = 11.7 for Natural Gas

Basis for Acceptability

The appliance shall not produce a concentration of carbon monoxide in excess of 0.04 percent in an air-free sample of the flue gases when the appliance is tested in an atmosphere having approximately a normal oxygen supply.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

D. TEMPERATURE LIMIT CONTROLS (Applicable Only to Pyrolytic Ovens):

METHOD

The cleaning cycle shall be started and, after the cavity has attained an equilibrium temperature, the input rate shall be increased by an increase in manifold pressure or other convenient means.

Basis for Acceptability

The limiting means shall then operate to control the temperature at or below the manufacturer's specified maximum cleaning temperature.

E. DIELECTRIC VOLTAGE-WITHSTAND TEST

Each product consisting of electrical components shall withstand without electrical breakdown, as a routine production line test, the application of a 60 Hz sinusoidal potential between the primary wiring, including connected components and accessible dead-metal parts and also between the primary wiring and accessible low voltage (42.1 V peak or less) metal parts, including terminals.

During the test, both sides of the primary circuit of the product are to be connected together to one terminal of the test equipment; the second test equipment terminal is to be connected to the accessible dead-metal.

METHODS

a. Method I - The test potential shall be:

(1) 1000 V plus twice normal test voltage, except as noted below.

(2) 1000 V for motors rated at not more than 1/2 hp (373 W output), and not more than 250 V.

The test potential indicated above shall be applied or 1 min.

b. Method II - The test potential may be increased to 120 percent of the values shown in Method I if the time of application is reduced to 1 s.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

The test shall be conducted when the product is fully assembled and with primary switch in the "on" position. It is not permitted to have the product unwired, modified or disassembled for the test.

Exception: Parts, such as snap covers or friction-fit knobs, which would interfere with performing the test, need not be in place.

In addition, if the product employs solid state components which can be damaged by the dielectric potential, the test may be conducted before the component(s) is electrically connected. However, a random sampling of each day's production is to be tested with the components electrically connected to ensure compliance with the above requirements.

III. MANUFACTURER'S TEST EQUIPMENT:

A. FLOW TEST EQUIPMENT

This test shall be run using a calibrated gas meter of the wet or dry type of the appropriate capacity, with temperature and pressure connections for correction factors (unless meter is temperature/pressure compensated).

B. COMBUSTION ANALYZER

Test Equipment - The equipment used to perform the test shall provide the following features.

1. Carbon monoxide to be measured by an infrared nondispersive type (preferred), wet chemical type, solid state type, or dry chemical type, maximum error of +2% of scale range (or 5% of reading).

(2) Carbon dioxide to be measured by an infrared nondispersive type (preferred), wet chemical type, solid state type, or dry chemical type, maximum error of +2% of scale range (or 5% of reading).

C. TEMPERATURES

Thermocouples are to be not larger than No. 24 ga or Certified mercury tube type thermometers. Calibrated temperature recorder or indicator to have a + 2 deg F scale range commensurate to temperatures measured.

D. ELECTRICAL MEASUREMENTS

Test Equipment - The equipment used to perform the test shall provide the following features.

(1) Voltmeter having 1-1/2 to 2 times the value to be measured. Smallest scale division not more than 1/50 of maximum scale range.

(2) Ammeter having 1-1/2 to 2 times the value to be measured. Smallest scale division not more than 1/50 of maximum scale range.

(3) Speed Measurement – Mechanical or electronic means that does not adversely effect motor speed.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

E. DIELECTRIC VOLTAGE-WITHSTAND TEST EQUIPMENT

Test Equipment - The equipment used to perform the test shall provide the following features.

(1) There shall be either a visible or audible means of indicating an electrical breakdown to the operator.

(2) There shall be either a manually reset device to restore the equipment after electrical breakdown, or an automatic feature that rejects any unacceptable unit.

(3) When a marking is used to indicate the test potential without an indicating voltmeter, the equipment shall include a positive means, such as an indicator lamp, to indicate that the manually reset device has been reset following an electrical breakdown.

GAS-FIRED FOOD SERVICE EQUIPMENT (LGQX)

MANUFACTURER'S TEST EQUIPMENT

The equipment specified below has been evaluated and found to be acceptable for conducting the Production-Line Tests indicated.

RESERVED FOR FUTURE USE:

Test	Manufacturer	Model No.

GENERAL

PRODUCT COVERED:

Gas-fired food service equipment.

Gas-fired food service equipment certified for Canada.

GENERAL:

These are gas-fired units and are intended for operations and fuels specified in the following Sections of this Procedure.

APPLICABLE SECTIONS:

Equipment described by this Procedure shall comply with this Section General and with the applicable Section (Nos. 1, 2, 3, etc.) except as follows:

1. Where construction is not described by the applicable Section (Nos. 1, 2, 3, etc.), this Section General shall apply.

2. Where the applicable Section (Nos. 1, 2, 3, etc.) specified constructions or materials not authorized by this Section General, the applicable Section (Nos. 1, 2, 3, etc.) shall apply.

LISTED AND RECOGNIZED COMPONENTS:

Components and materials described in this Procedure as "Listed" shall be currently Listed by Underwriters Laboratories Inc., under the Listing program and shall be marked with the Listing Mark.

Components and materials described in this Procedure as Recognized Components (R/C) shall be currently Recognized by Underwriters Laboratories Inc. under the Component Recognition program and shall be marked with the Recognition Mark.

Components and materials described in this Procedure as Canadian Standards Associated (CSA) Certified shall be currently Certified by the Canadian Standards Association and shall be marked with the Certification identification.

For C-UL Classified equipment, components and materials described in this Procedure as Canadian Gas Association (CGA) Certified shall be currently Certified by the Canadian Gas Association and shall be marked with the Certification identification.

CORROSION PROTECTION:

Corrosion protection described in this Procedure shall be provided on all surfaces of the described part, except where the description specifically indicates otherwise.

FUSE MOUNTING AND ENCLOSURE:

The fuse enclosure shall be arranged so that the fuse can be replaced without removing parts other than a service cover or panel, and a cover or door enclosing the fuse.

A fuseholder shall be so designed, installed or protected that all adjacent uninsulated high voltage live parts will not be exposed to contact by persons removing or replacing fuses.

MARKING:

Marking Material - Except as noted, marking material shall be metal affixed by mechanical means or R/C PGDQ2 Marking and Labeling System or PGJI2 Printing Materials, suitable for affixation to stainless steel, occasional exposure to water and cooking oil, with a temperature rating of at least 60°C, unless indicated otherwise in the individual report. Except as noted, all markings shall be located and attached to a substantial part not likely to be removed or replaced in service and at a location visible after the equipment is installed. The markings may be on a combined label or several labels.

*1. **Listing** Mark as specified under "Description" in the individual Procedure Sections.

*2. **Listed** company's name, city and state.

*3. **Listed** company's model number of equipment.

4. A distinctive number, letter or number and letter code which will identify an individual appliance or production lot of a limited group of appliances. This may be in the form of a serial number where the manufacturer keeps records on which serial numbers are used on which appliance.

5. The firing rate in Btu/h of each burner or group of burners operating as a unit for each gas for which the appliance is equipped as specified under "Ratings" in the individual Procedure Sections.

6. The type of fuel for which the appliance is intended to operate with as specified under "Ratings" in the individual Procedure Sections.

A. A nonconvertible appliance shall be marked for only the type of gas for which it is equipped.

B. A convertible appliance that is intended to fire LP (Propane) gas that is equipped with double coaxial orifices shall be marked for LP (Propane) gas and only the other type of gas for which equipped. Such an appliance shall also be marked with the phrase "This appliance can be used with LP (Propane) gas and other type of gas. It is shipped from the factory adjusted for use with (type of gas) gas: ORIFICE HOODS MUST BE SCREWED TIGHT WHEN LP (PROPANE) GAS IS USED. For your safety refer to installation instructions for conversion procedure".

C. An appliance convertible for use with natural and either propane gas or LP gases shall be supplied with two sets of orifices and shall be marked, "For Natural gas when equipped with No. (drill size for natural gas firing) drill size orifice. For Propane (LP) gas when equipped with No. (drill size for propane gas or LP gas firing) orifice. For your safety refer to installation instructions for conversion procedure".

7. The manifold gas pressure in inches water column at the normal inlet gas test pressure as specified under "Ratings" in the individual Procedure Sections.

8. The statement "Intended for other than household use".

9. Electrical ratings as specified under "Ratings" in the individual Procedure Sections.

10. Lighting instructions for the appliance which specifies a 5 min complete shutoff period before the appliance is relighted.

11. The following phrase at an exterior and conspicuous location onthe appliance. The uppercase letter shall be at least 0.120 in. high and the lowercase 0.046 in. high. "WARNING: Improper installation, adjustment, alternation, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment".

12. Instructions for lubrication of motor bearings or a statement that the motors are permanently lubricated. This marking shall be on the fan or blower or motor housing or on a surface adjacent to the means for accessing the motors.

13. An appliance with removable legs, casters or a base shall be marked to the effect that the appliance is for use only with the specific legs, or casters, or base as specified by the manufacturer.

14. An appliance which is caster mounted shall be marked with the following phrase at an exterior location at the front of the appliance. The marking shall be in black letters on a yellow background, the word "NOTICE" shall be a minimum height of 0.360 in., and the remainder of the lettering shall have a minimum uppercase height of 0.180 in. with a minimum vertical spacing height of 0.069 in. "NOTICE When this appliance is installed with casters, it must be installed with the casters supplied, a connector complying with either ANSI Z21.69 or CAN/CGA-6.16 and a quick disconnect device complying with either ANSI Z21.41 or CAN1-6.9. It must also be installed with restraining means to guard against transmission of strain to the connector, as specified in the appliance manufacturer's instructions".

Alternate - The marking required in Item 14 above may be provided as two separate markings as follows:

For UL Listed Equipment - "NOTICE When this appliance is installed with casters, it must be installed with the casters supplied, a connector complying with ANSI Z21.69 and a quick disconnect device complying with ANSI Z21.41. It must also be installed with restraining means to guard against transmission of strain to the connector, as specified in the appliance manufacturer's instructions".

For C-UL Listed Equipment - "NOTICE When this appliance is installed with casters, it must be installed with the casters supplied, a connector complying with CAN/CGA-6.16 and a quick disconnect device complying with CAN1-6.9. It must also be installed with restraining means to guard against transmission of strain to the connector, as specified in the appliance manufacturer's instructions".

15. An appliance with a flexible service cord for connection to a line voltage electrical supply shall have an attached tag at the plug end of the cord with the following phrase, "WARNING - Electrical Grounding Instructions - This appliance is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug".

16. An appliance rated more than 15 A and having an attachment plug that is rated less than 125 percent of the current rating of the appliance shall be marked with the phrase, "For use on individual branch circuits only".

17. An appliance having provision for permanent connection to multiple power supplies shall be marked with the following phrase on the exterior of the access cover which gives accessibility to the live parts, "CAUTION: This appliance has more than one power supply connection point. Disconnect power supplies before servicing".

18. Installation clearances to combustible material as specified under "Installation" and as specified under "Marking" in the individual Procedure Sections.

19. An appliance intended for installation with a draft hood whose gross flue gas temperature is less than 480°F shall be marked with the following phrase, "Suitable for connection to Type B Gas Vent when used with the draft hood provided".

20. Other marking specifically related to the type and construction of the appliance shall be provided as specified under "Marking" in the individual Procedure Sections.

SECUREMENT OF ELECTRICAL COMPONENTS:

Uninsulated live-metal parts shall be secured so they will be prevented from turning or shifting by means other than friction between surfaces, if such motion may result in a reduction of spacing below the minimum specified.

WIRING DIAGRAMS:

A wiring diagram which schematically illustrates all factory wiring of the unit supply circuit's connections to be made in the field, wiring between remotely located and factory-installed equipment, wiring of field-installed, field-furnished optional or auxiliary equipment, etc., shall be furnished with each unit. The diagram shall be affixed to the inside cover or door of the main control cabinet as specified in "Marking" in this Section General. Appropriate Sections of this Procedure include one or more wiring diagrams typical of those to be furnished with each unit.

MOTORS, CIRCUIT PROTECTION, OVERCURRENT PROTECTION, CONTROLLERS:

Motors - See applicable Section of this Procedure for motors which have been found suitable. Motors shall be marked for continuous duty.

Motor Overcurrent Protection - A motor shall be provided with suitable overcurrent protection as follows:

A. The motor incorporates R/C inherent thermal protection, or

B. The motor is protected by Listed thermal overload relays or by thermal overload relays provided as part of a Listed motor controller. The thermal overload relays shall be manually reset (unless otherwise specified in the following sections of this Procedure) and shall be rated as follows:

1. A 40°C trip current rating (as detailed on the heater table attached to the unit) not greater than 1.25 times the motor marked FLA for motors marked for temperature rise of 40°C, except as permitted by (3),

2. A 40°C trip current rating (as detailed on the heater table attached to the unit) not greater than 1.15 times the motor marked FLA for motors marked except as permitted by (3), or

3. Exception - If heaters provide 125 percent protection as in (1) or 115 percent as in (2) and protection cannot be selected from available ratings in heater may be used, but in no case to exceed -

   a. 1.40 times the motor marked FLA for motors marked for a temperature rise of 40°C, for motors with marked service factor not less than 1.15.

   b. 1.30 times the motor marked FLA for motors marked for a temperature rise other than 40°C.

Not less than one thermal overload relay shall be provided (in the ungrounded leg) for 1 phase motors and three properly rated thermal overload relays for 3 phase motors. The heater table shall be provided as an attached marking on the enclosure containing the overload relays.

FACTORY WIRING:

Except where other methods or materials are described in the following Sections of this Procedure, factory wiring shall be as follows.

All wiring for circuits greater than 24 V shall be done with Listed metal-clad cable or with Listed wiring material enclosed in Listed rigid or flexible metal conduit, electrical metallic tubing, or in a control box or equivalent metallic enclosure. Listed fittings, suitable for the application, shall be employed. The conduit or tubing shall be of sufficient size to receive the conductors without crowding or pinching.

The following includes some wiring materials Recognized for use if enclosed as indicated in the preceding paragraph.

Type of Wiring or Wiring Material FFH-2, TF, TFF, TFN, TFFN, SF-2, SFF-2, RH, RHH, RHW, RUH, RUW, T, THW, XHHW, MTW, THW-MTW, THWN, TW or thermoplastic appliance wiring material with insulation thickness of 2/64 in. (0.8 mm) for No. 10 AWG (5.3 mm^2) and smaller, 3/64 in. (1.2 mm) for No. 8 AWG (8.3 mm^2), 4/64 in. (1.6 mm) for No. 6, 4, 3 or 2 AWG (13.3, 21.2 for No. 1, 1/0, 2/0, 3/0 or 4/0 AWG [42.4, 53.5, 67.4, 85.0 or 107.0 mm^2]).

Wiring material shall have a voltage and temperature rating consistent with their use. A conductor, other than an integral part of a component shall be not smaller than No. 18 AWG (0.82 mm^2).

Flexible metal conduit, if used, shall be not smaller than 3/8 in. (9.5 mm) trade size. Flexible metal conduit shall be mechanically secured at intervals not exceeding 4-1/2 ft (1.37 m) and within 12 in. (305 mm) on each side of every junction box or point of termination.

Flexible metal conduit need not be mechanically secured, if length is not over 36 in. (0.9 m).

Exempt from this requirement are leads from combustion detectors which are not required to be enclosed in flexible metal conduit if enclosed to prevent mechanical injury.

Wire sizes shall be adequate for the loads carried as specified in the National Electrical Code (NEC), but shall not be less than No. 14 AWG for motor circuits and not less than No. 18 AWG for all other circuits. Wiring in motor circuits shall conform to the following table.

Full-Load Current Rating of Motor Not Greater Than, A	Wire Not Smaller Than, AWG
12	14 (2.1 mm^2)
16	12 (3.3 mm^2)
24	10 (5.3 mm^2)

All factory wiring shall be protected against mechanical injury, shall be properly supported and routed to prevent damage due to contact with sharp edges, moving parts, or parts which may emit high temperatures and shall be of materials and construction as described below.

Splices shall be installed in a suitable enclosure, such as a control box or junction box. Splices shall not be installed in conduit.

Electrical connections at terminals shall be mechanically secure, without loose strands, making reliable contact without strain at the connections.

Terminals wire connectors shall be Listed pressure type, "eyelet" type, or "spade" type with upturned ends. Minimum spacings shall be maintained with wire connector in any position of rotation. In lieu of wire connector, cupped washer may be used, solid wire may be formed into loop, or stranded wire may be formed into loop and soldered.

Unless supplied with insulation suitable for the highest voltage involved, insulated conductors of different circuits shall be separated by barriers or shall be segregated from each other and shall in any case, be separated or segregated from uninsulated current-carrying parts connected to different circuits. Segregation of insulated conductors may be accomplished by clamping or routing or equivalent means which provide permanent separation of insulated or noninsulated current-carrying parts from those of different circuits.

The spacing between uninsulated live-metal parts of opposite polarity, and between such parts and dead-metal parts, shall not be less than those specified in the following tables. These spacings do not apply to electrical clearances in UL Listed, UL Recognized, CSA or CGA Certified Components.

Minimum Spacings Other Than At Field-Wiring Terminals and Motors, in. (mm)

Potential, Volts	Over Surface, A	Through Air, A
0-50	1/16 (1.6)	3/64 (1.2)
51-125	3/32 (2.4)	1/16 (1.6)
126-250	1/8 (3.2)	3/32 (2.4) b, c
126-250	5/32 (4.0) b, c	1/8 (3.2) b, d
251-480	1/4 (6.4) b, d	5/32 (6.4) b
481-600	3/8 (9.5) b, e	1/4 (9.5) b

a. At heating elements, these spacings shall not be less than 1/16 in. (1.6 mm) up to 300 V.

b. Enameled wire is to be considered as if it were an uninsulated live part. However, 3/32 in. (2.4 mm) and greater spacings over surface and through air are acceptable between dead-metal parts and enameled wire that is rigidly supported and held in place on a coil.

c. Between uninsulated live parts and grounded metal.

d. Between uninsulated live parts of opposite polarity.

e. At heating elements this spacing shall not be less than 1/4 in.

Minimum Spacing At Field Wiring Terminals

	Minimum Spacings in. (mm)			
	0-250 V		251-600 V	
Parts Involved	Through Air	Over Surface	Through Air	Over Surface
Between live parts of opposite polarity and between live part and a dead-metal part other than the enclosure	1/4 (6.4)	3/8 (9.5)	3/8 (9.5)	1/2 (12.7) a
Between a live part and the enclosure	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)

a - A spacing of not less than 3/8 in. (9.5 mm) over surface is acceptable at wiring terminals in a wiring compartment or terminal box that is integral with a motor.

FIELD WIRING:

Except where otherwise specified in the following sections of this Procedure, provisions for field connection of supply and external control circuits shall be as detailed in the following paragraphs.

FIELD WIRING COMPARTMENT FOR PERMANENT (NONCORD CONNECTED) ELECTRICAL CONNECTIONS:

The location of an outlet box or compartment in which field-wiring connections are to be made shall be such that these connections may be inspected after the equipment is installed as intended. Outlet boxes shall be Listed unless otherwise described in the following sections of this Procedure.

The connections are to be accessible without removing parts other than a service cover or panel and the cover of the outlet box or compartment in which the connections are made. A cover mounted component such as a transformer, may serve as a cover of an outlet box or compartment in which field-wiring connections are to be made.

Terminal and Pigtail Leads - Connections shall be made to terminals, or to pigtail leads at least 6 in. (152 mm) long, in the outlet box or compartment. Where connections are to be made to pigtail leads, such leads shall not be connected to factory-wired terminals in the same compartment unless specifically described in the applicable section of this Procedure, and suitable strain relief shall be provided. Pigtail leads for splice connection, and factory-installed wiring to field wiring terminals shall not have green or green with a yellow stripe insulation. Conductors (pigtail leads and factory-installed wiring to field-wiring terminals) intended for connection to a grounded neutral line shall have white or natural gray insulation. All other conductors shall be finished in colors other than white or natural gray.

Leads intended for connections to an external circuit shall be provided with strain relief if stress on the lead may be transmitted to terminals, splices, or internal wiring which may cause the lead to separate from its terminations or result in damage to the lead from sharp edges.

All terminals intended for field-wiring connections are identified to correspond with wiring diagrams.

The wiring space and terminals shall be suitable for the proper connection of such conductors of the size described above.

Equipment Grounding - The appliance shall be constructed so that the enclosure, frame and similar noncurrent-carrying metal parts are electrically continuous to the point of connection of the equipment grounding means. Unless otherwise specified grounding continuity is maintained between all internal and external dead-metal parts by star locked washers beneath the head of securing screws, plated steel surfaces or paint removed from mating surfaces. A wire binding screw intended for the connection of an equipment grounding conductor shall have a green colored head that is hexagonal, slotted, or both. A pressure wire connector intended for connection of such a conductor shall be identified by being marked "G", "GR", "GROUND", "GROUNDING", or by a marking on a wiring diagram provided on the unit. The wire binding screw or pressure wire connector shall be so located that it is unlikely to be removed during normal servicing of the equipment. At a wire binding screw, upturned lugs, or the equivalent, shall be provided to retain the conductor. If a pressure connector is used adjacent to the connectors intended for the supply conductors and if it could be mistaken for the neutral of a grounded supply, a marking shall be additionally provided indicating "EQUIPMENT GROUND" and/or identifying the connector by a green color.

The equipment grounding terminal or lead shall be located in the field-wiring compartment and shall be suitable for connection of an equipment grounding conductor of at least the size required by the National Electrical Code for the rating of the power supply circuit to be connected.

The surface of an insulated lead intended solely for the connection of an equipment grounding conductor shall be a continuous green color or a continuous green color with one or more yellow stripes, and no lead visible to the installer other than an equipment grounding conductor, shall be so identified.

GAS PIPING, TUBING AND FITTINGS:

Piping, Tubing and Fittings - Tubing shall be seamless drawn copper tubing or aluminum tubing, or steel tubing of the seamless, brazed, or welded type. All tubing shall terminate in suitable Listed tubing fittings. Black iron piping used shall be Schedule 40 or heavier wrought iron or steel pipe. Fittings used with this type shall be of malleable iron or steel.

All unions shall be of the ground joint type or flanged joint type specified in the list as suitable for the type of fuel marked on the equipment.

Copper semi-rigid tubing or tubing with internal copper surfaces shall not be used for conveying gas.

When seamless drawn copper or aluminum tubing is used, it shall have a wall thickness not less than that indicated in the following table.

Wall Thickness - Seamless Drawn Copper or Aluminum Tubing

Outside Diameter, in.	Minimum Wall Thickness, in.
1/8	0.020 (0.508 mm)
3/16	0.025 (0.635 mm)
1/4	0.029 (0.734 mm)
5/16	0.029 (0.734 mm)
3/8	0.032 (0.813 mm)
7/16	0.032 (0.813 mm)
1/2	0.038 (0.966 mm)
9/16	0.038 (0.966 mm)
5/8	0.038 (0.966 mm)
3/4	0.045 (1.143 mm)
7/8	0.045 (1.143 mm)

When stainless steel tubing is used, it shall be Type 304 and wall thickness not less than indicated in the following table.

Wall Thickness - Stainless steel Type 304 tubing.

Outside Diameter, in.	Minimum Wall Thickness, in.
3/16	0.00815
1/4 - 3/4	0.010

MOVING PARTS:

Moving parts which may cause injury shall be enclosed or guarded against accidental contact by means of a cover, screen or equivalent means as described in the appropriate Sections of this Procedure.

If the removal of doors, panels, shields, etc. will expose such moving parts, the following conditions are required.

1. The opening or removal of the door, panel or shield shall require the use of tools, or

2. An interlocking device shall shut off the power to the mechanism.

CONTROL APPLICATION:

All safety control or protective device switches shall interrupt all ungrounded conductors.

Nothing shall be provided for the purposes of permitting any safety control to be rendered ineffective or to allow firing of the equipment without the protection of each of the required safety controls.

GAS PILOT EQUIPPED APPLIANCES - PILOT AND PILOT LINE CONTROLS:

An intermittent or interrupted pilot may be provided. The pilot gas supply is taken upstream of all main gas controls including the main gas-pressure regulator. The pilot gas line includes the following controls in the order indicated:

1. Pilot Gas Manual Valve - CSA Certified or UL Listed brass body, quarter-turn valve of spring-loaded or lubricated-plug type with handle attached. Located upstream of all other pilot line controls. May be incorporated in a combination gas control.

2. Pilot Gas Pressure Regulator - CSA Certified or UL Listed gas appliance pressure regulator spring-loaded diaphragm type. Outlet pressure, or pressure range, marked on regulator shall be suitable for pilot operation. Located between manual shutoff valve and electric safety valve. May be incorporated in a combination gas control.

3. Pilot Gas Safety Shutoff Valve - CSA Certified or UL Listed electrically-operated valve of the solenoid type suitable for use with the type of gas specified in the appliance. Located downstream of all other pilot line controls. May be incorporated in a combination gas control.

GAS PILOT EQUIPPED APPLIANCES - MAIN BURNER CONTROLS AND DIRECT IGNITION EQUIPPED APPLIANCES - MAIN BURNER CONTROLS:

Each appliance shall be equipped with the following main burner controls installed in the main gas piping in the order indicated.

1. Main Gas Shutoff Valve - CSA Certified or UL Listed manually-operated valve with handle permanently attached by being an integral part of the plug or welded or peened to the plug or secured by mechanical means. On and off positions shall be indicated on the valve. See gas piping diagrams in applicable Sections for the location of the valve in the main section of the gas piping.

2. Main Gas Pressure Regulator - CSA Certified or UL Listed gas appliance pressure regulator. Outlet pressure, or pressure range, marked on regulator shall be suitable of manifold gas pressure marked on the appliance. Located between manual shutoff valve and electric safety valve. The regulator shall be equipped with a threaded opening for connecting a vent line or shall be provided with an integral vent limiter. See gas piping diagrams in applicable Sections for the location of the valve in the main section of the gas piping.

3. Main Gas Safety Shutoff Valves - Each appliance shall be equipped with one or more CSA Certified or UL Listed electrically-operated safety valves rated for use with gas fuels to provide safety shutoff of main burner gas. Valves shall have a maximum closing time of 5 s. The maximum closing time of the safety shutoff valve is marked on the valve, or shall be determined during "Manufacturing and Production Tests". See gas piping diagrams in applicable Sections for the location of the valve in the main section of the gas piping.

4. Test Gauge Connection - A 1/8 in. IPS (10.29 mm outside diameter) or larger plugged tapping shall be furnished immediately downstream of each main gas pressure regulator or main gas safety valve to facilitate testing each automatic valve for leakage when in the closed position.

MANUFACTURING AND PRODUCTION TESTS:

The manufacturer shall test the components and assemblies of each appliance in the following manner:

1. Test each factory assembled burner and manifold and control assembly for proper gas valve operation and verify the gastightness of the manifold and control assembly.

2. Test each appliance to determine that electrical components function properly. This test shall be conducted on completely assembled appliances, when feasible. When not feasible, assemblies shall be tested separately.

3. Conduct dielectric withstand tests on each factory assembled appliance. If the appliance employs solid state components which can be damaged by the dielectric potential, the test may be conducted before these components are electrically connected. The tests shall consist of the application of a 60 Hz potential between high-voltage current-carrying parts and the casing, frame and similar noncurrent-carrying parts of the appliance with any switch contacts both open or closed. The potential shall be 1000 V ac, applied for one minute, or a potential of 1200V ac, applied for one second for units rated 250 V ac or less. The equipment specified below shall be maintained for the required production line tests. The instruments used for the required tests shall be calibrated at regular intervals (at least once annually). Calibration may be done by the manufacturer or an outside laboratory. In either case, it shall be by comparison with a Standard that is traceable to a national Standard. Certification of this calibration shall be maintained by the manufacturer and be available to UL personnel. During the period of production, test equipment shall be checked for proper operation at least once daily.

4. No less than once every twelve months, a completely assembled basic model shall be tested to determine satisfactory operation with respect to:

   a. Burner operating characteristics;
   b. Ignition systems and safety shutoff devices; Combustion;
   c. Temperature limit controls (applicable only to pyrolytic ovens); and
   d. Dielectric withstand with solid-state components connected (if not tested under (3) above).

The manufacturer’s test method(s) shall be capable of relating back to the test(s) specified in the Standard.

5. Purchased and manufactured components shall be inspected, using a sampling plan, to verify critical specifications. Specifications shall be determined critical if, when out of tolerance, they would adversely affect the safety performance with respect to the test specifications outlined above.

The following methods of inspection are acceptable:

a. Visual verification shall be used for all components vendor-documented or marked as complying with a nationally Recognized Standard; or
b. Dimensional verification shall apply to all components not covered by “a” above.

PACKING FOR SHIPMENT:

Each shipment shall be prepared in a manner to avoid damage during transit and shall consist of a complete assembly unless otherwise specified in the individual Sections. All openings for fuel lines shall be capped or plugged prior to shipment.

Operating and installation instructions, in addition to the appropriate wiring diagram, shall be furnished with each unit. See individual Procedure Sections for details.