



# SPECIAL FURNACE CO INC

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## XLE SERIES

### APPLICATIONS

The XLE Series are highly uniform and controllable electric box furnaces widely adaptable to many applications. In the heat treating field these include hardening, neutral hardening, solution heat treating, stress relieving, annealing, aging, precipitation hardening, and tempering. In the ceramic field applications include ceramic bisque firing, thin film processing, glazing, and decorating. Brazing, calcining, drying, melting of glass and metals, glass annealing and bending, enameling, and sintering are just some of the other applications XLE furnaces are used for. Although "standard" configurations are made, each furnace is normally fitted with standard and special options to suit specific needs. These include vertical doors, fans, cooling venturis, vents, special hearths, racks, baskets and loading devices, quenching systems, various controlled atmospheres, retorts, viewing ports, special element alloys, special thermocouples, various kinds of alarms, program controls, and recorders.



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**PRECISION ELECTRIC BOX FURNACES**  
**2350°F (1287°C)**

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## FEATURES

### FAST HEAT UP & COOL DOWN

An empty furnace will heat up to 2000°F (1093°C) in approximately 1-1/2 hours. The high K.W. (superpower) option will trim this to 1 hour. Cool down to 500°F (260°C) is approximately 5 hours. Optional 300 or 600 CFM venturi will speed cooling.

### EXCELLENT UNIFORMITY

The furnace is uniform to within +/-20°F (+/-10°C) above 1400°F (760°C) within the Uniform Working Dimension (see specification chart). Optional fan systems are available for tighter uniformity of up to +/-5°F. Tighter uniformity is also achieved by reducing the working dimensions and with multi-zoning.

### TEMPERATURES TO 2350°F

With optional nickel-chrome elements the maximum temperature is 2100°F (1134°C.) Some options such as fans and other alloy components may also limit the temperature.

### PRESHAPED BRICK SECTIONS SAVE ON HEAT LOSS AND MAINTENANCE COSTS



The refractory is cemented in sections on a very flat table. These sections are then precision cut and routed. All sections fit together with engineered heat locks which improve the insulating integrity of the furnace even after many years of service. Brick sections can easily be installed by in-house maintenance personnel saving on expensive specialized bricklayer labor.

### EFFICIENT MULTILAYERED INSULATION

The furnace is insulated with 4-1/2" of low K factor refractory firebrick backed up by 2" of very low K factor mineral wool board on all surfaces except the bottom which has 2" of hard calcium silicate back up for solid hearth support. This yields an excellent combination of strength, insulating quality, and fast heat up and cool down times. The roof of all models which are 24" wide or above is made from 2600°F ceramic fiber modules to prevent roof failure.

### LOW WATT DENSITY ELEMENTS FOR LONG LIFE

The standard elements are coiled from high grade iron-aluminum-chrome alloy (Kanthal A-1 or the equivalent). Nickel-chrome (80-20), Chromel AA, and other alloys are available for special atmospheres and applications. A watt density normally below 10 watts per square inch maximizes element life. (Watt density is the ratio of watts to square inches of radiating surface area).

### EVEN ELEMENT PLACEMENT

Each element is separately and evenly spaced on the bottom, sides, door and back. This is the finest method of distributing radiant heat energy at high temperatures and is unique to L&L furnaces.

### CERAMIC ELEMENT HOLDERS

The elements are supported in proprietary high temperature ceramic element holders. These provide perfect support for the coiled element and excellent radiating characteristics. The smooth surface of the holder prevents premature failure of the element as it expands and contracts. These holders, coupled with a unique all ceramic element terminal, make element replacement easy. Being recessed into the wall of the furnace these elements are not as susceptible to mechanical damage as some other types of element support systems.



### CERAMIC ELEMENT TERMINALS MAKE ELEMENT CONNECTIONS EASY AND TROUBLE FREE



Unique L&L designed all ceramic element terminal blocks allow the element ends to be clamped without twisting the whole end around a terminal bolt, making it easy to remove an element. The connection wires can be easily removed without disturbing the element termination (which allows you to easily isolate an element for a resistance check.) The terminal block features superb electrical isolation characteristics.

### HEAVY DUTY CASE WITH INTEGRATED STAND

The furnace case is constructed of 10 gauge steel with external bracing angles welded to the entire case and base assembly. Leveling bolts, anchoring holes and lifting rings are included. The main seams are continuously welded for an attractive appearance. The entire case is primed inside and out with a high temperature (800°F) silicone based paint. The final coat is a heat resistant enamel. Custom colors are available. Sealed cases for controlled atmosphere use are optional.

### DOUBLE PIVOTED PLUG DOOR KEEPS HEAT AWAY FROM OPERATOR AND ALLOWS FOR TIGHT DOOR SEAL

The standard door is a double pivoted horizontal plug door. The double pivoting allows the door to open like a parallelogram which keeps the hot face from the operator. There are two heavy duty clamps for tight sealing. Because of the completely horizontal motion of the door as it is sealing there is no wear on the seal face. The door has a 3/4" refractory plug which protrudes into the furnace chamber and provides a highly effective heat lock. There is a 3-1/2" refractory to refractory seal around the perimeter of the door. Counterbalanced vertical doors with hand crank, pneumatic or electric actuator are options. Vertical doors lift away from the furnace seal before lifting up. They also include a heat locking plug.

### A WIDE VARIETY OF HEARTHS

The standard hearth is one or more 3/4" thick ceramic plates elevated on ceramic blocks 1-1/2" above the bottom elements. This air space improves uniformity. Silicon carbide plates, alloy plates, roller hearths, baskets, racks, loaders, castable piers, air cooling tables and many other loading options are available.

**SIDE MOUNTED CONTROL PANEL WITH HINGED DOOR HOLDS ALL COMPONENTS**

All temperature controls, relays, contactors, power controls, switches, transformers and fuses are located in a side mounted NEMA 1 control panel with a gasketed hinged door. J.I.C. wire coding is used throughout. An oil tight NEMA 13 lighted on/off push-button switch turns the furnace on. Controls are mounted at eye level for easy visibility. A NEMA 12 panel with fused disconnect switch is optional. A cooling fan is included with SCR power controls.

**DIGITAL HONEYWELL UDC 2300 PID TEMPERATURE CONTROL**

A Honeywell UDC 2300 microprocessor based digital single set point control is standard. Two full vacuum fluorescent displays include English language programming information for easy set up. This is one of the easiest digital controls to operate. Accuracy is .25% of scale. All PID tuning constants (proportioning band, reset, rate) plus maximum temperature, scale range, thermocouple type and many other parameters are programmable. Ramp/Soak programming is optional. Many other controls are optionally available.

**DIGITAL HONEYWELL UDC 2300 HIGH LIMIT CONTROL**

A Honeywell UDC 2300 digital high limit control, complete with back up contactors and separate thermocouple, shuts off furnace if temperature or power control fail. The digital control allows a maximum temperature to be programmed into the control.

**MERCURY CONTACTORS FEATURE FAST CYCLE TIME FOR ACCURATE CONTROL**

Other benefits are long contactor life and quiet operation. SCR power controls are optional.

**TWO ZONE CONTROL FOR CLOSE GRADIENTS**

The elements are divided into top and bottom zones. The control output is routed through two input switches to allow adjustment of the total time on to each zone. There are thermocouples mounted top and bottom with a selector switch to read the differential. Special designs with up to six zones or more can be used to promote even greater temperature uniformity.

**TYPE K THERMOCOUPLES WITH SHIELDED EXTENSION WIRE**

Type K open thermocouples are standard. All thermocouple lead wire is shielded from electrical noise and grounded to a common ground. Lead wires are carefully run to avoid interference from power wiring. Inconel sheathed Type K are a commonly supplied option. Type R and Type S platinum thermocouples are also optional.

**MANY SAFETY FEATURES**

Thermocouple break protection is included. Limit switches shut off power to furnace if the door is opened or the power panel back is removed. Control voltage is transformed to 120 volts. The control and branch power circuits are fully fused.

**BUILT IN RELIABILITY**

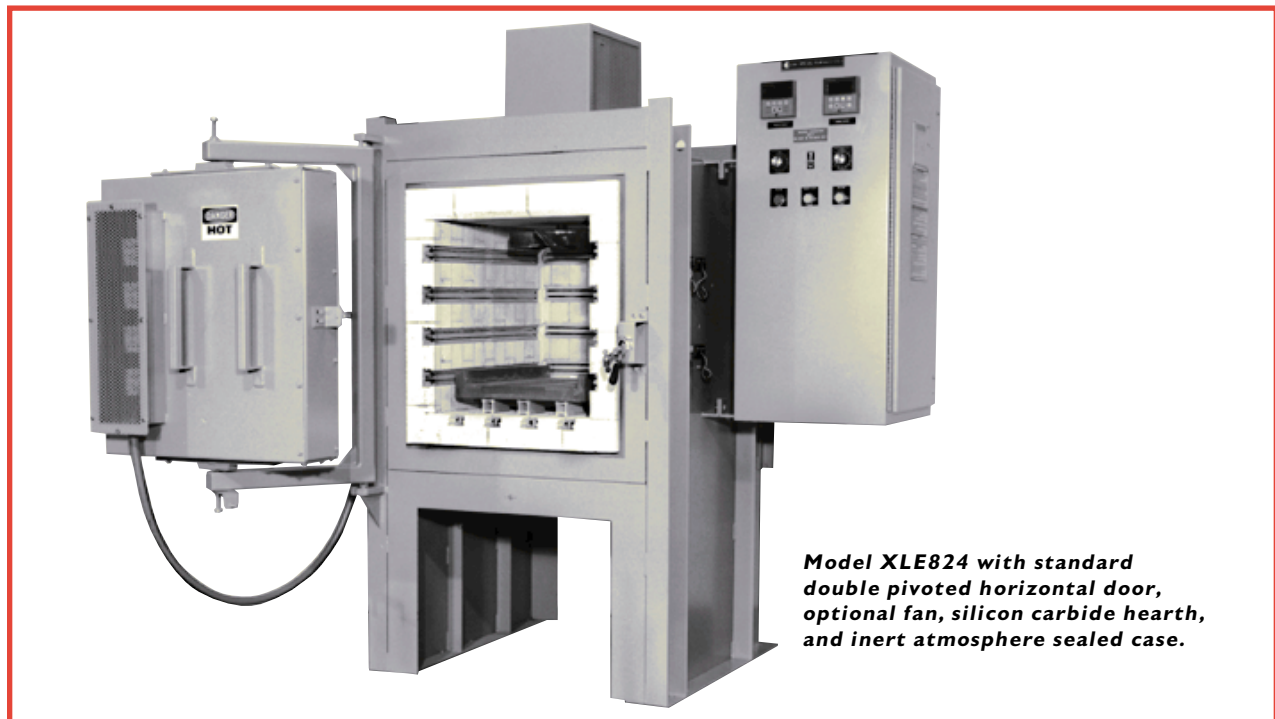
The furnace is warranted for one year except for the elements and thermocouples (six months.) The control system is burnt in and calibrated at actual operating temperatures in a test furnace and a recording of this test is provided. As a result of having made a large number of these furnaces, the engineering thought and detail devoted to this series is extensive. L&L has paid great attention to small details, interchangeable parts, serviceability, reliability, adjustments, documentation and instructions. The design has continuously evolved over 40 years.

**EXTENSIVE INSTRUCTIONS AND DOCUMENTATION**

Along with the informative J.I.C. wiring diagram, which includes a sequence of operations and a ladder diagram (for easy troubleshooting), there is an extensively detailed instruction book with a general dimension and assembly drawing, start up, installation, operation, maintenance and troubleshooting information.

**WORLDWIDE SERVICE**

Although these furnaces are designed for easy in-house start up and maintenance, worldwide factory service and start up assistance is available.



**Model XLE824 with standard double pivoted horizontal door, optional fan, silicon carbide hearth, and inert atmosphere sealed case.**

# SPECIFICATIONS

MODEL NUMBER	ACTUAL INSIDE DIMENSIONS			UNIFORM WORKING DIMENSIONS			HEARTH DIMENSIONS		EXTERNAL DIMENSIONS HOR DOOR			OPTIONAL VERTICAL DOOR HEIGHT	K.W. RATINGS STAND SUPER		K.W. HEAT LOSS	K.W. HEAT STORAGE	STAND LOAD WGHT LBS	APRX SHIP WGHT LBS
	W	H	D	W	H	D	W	D	W	H	D		K.W.	K.W.				
XLE 524	16	18	25	13	13	20	13	22	54	59	48	99	13.5	18.0	1.3	18.1	175	1600
XLE 814	19	15	25	16	10	20	16	22	57	56	48	93	14.0	18.0	1.3	18.0	200	1700
XLE 816	19	15	37	16	10	32	16	32	57	56	60	93	19.0	25.0	1.7	24.5	300	1900
XLE 824	19	21	25	16	16	20	16	22	57	62	48	105	17.0	22.0	1.6	22.2	200	1800
XLE 836	19	21	37	16	16	32	16	32	57	62	60	105	22.5	29.0	2.1	29.8	300	2100
XLE 848	19	21	49	16	16	44	16	44	57	62	72	105	27.0	36.0	2.7	37.4	400	2500
XLE 214	25	21	25	22	16	20	22	22	63	62	48	105	20.0	26.0	1.8	23.2	300	1900
XLE 236	25	21	37	22	16	32	22	33	63	62	60	105	27.0	35.0	2.4	30.3	450	2200
XLE 244	25	27	25	22	22	20	22	22	63	68	48	117	27.0	35.0	2.2	27.9	300	2100
XLE 246	25	27	37	22	22	32	22	33	63	68	60	117	31.5	42.0	2.8	36.2	450	2400
XLE 248	25	27	49	22	22	44	22	44	63	68	72	117	38.0	49.5	3.5	44.5	600	2800
XLE 272	25	27	73	22	22	68	22	66	63	68	96	117	51.0	68.0	4.9	61.0	900	3500
XLE 448	25	51	25	22	46	20	22	22	63	93	48	N/A	38.0	49.4	3.5	47.0	300	2900
XLE 3248	31	27	49	28	22	44	28	44	69	68	72	117	48.0	64.0	4.0	50.1	700	3100
XLE 3260	31	27	61	28	22	56	28	56	69	68	84	117	55.0	71.5	4.7	59.1	850	3500
XLE 3272	31	27	73	28	22	68	28	66	69	68	96	117	59.0	78.5	5.5	68.2	1000	3900
XLE 3348	31	33	49	28	28	44	28	44	69	74	72	129	48.5	65.0	4.5	57.7	700	3400
XLE 3360	31	33	61	28	28	56	28	56	69	74	84	129	60.0	78.0	5.4	67.9	850	3800
XLE 3372	31	33	73	28	28	68	28	66	69	74	96	129	66.5	88.5	6.2	78.1	1000	4200
XLE 3436	37	27	37	34	22	32	32	32	75	68	60	117	40.0	52.0	3.7	46.0	600	2900
XLE 3448	37	27	49	34	22	44	32	44	75	68	72	117	48.0	64.0	4.5	55.8	900	3400
XLE 3472	37	27	73	34	22	68	32	66	75	68	96	117	66.0	88.0	6.1	75.3	1200	4200
XLE 3636	37	39	37	34	34	32	32	32	75	80	60	141	51.0	61.3	4.7	60.1	600	3300
XLE 3648	37	39	49	34	34	44	32	44	75	80	72	141	56.0	66.5	5.6	72.1	900	3900
XLE 3672	37	39	73	34	34	68	32	66	75	80	96	141	82.0	109.0	7.6	96.3	1200	4800
XLE 4060	42	39	61	39	34	56	36	56	79	80	84	141	70.0	91.0	7.1	89.2	1000	4600
XLE 4080	42	39	81	39	34	76	36	76	79	80	104	141	96.0	125.0	8.8	110.2	1500	5400

Dimensions are in inches. External dimensions include typical control panel mounted on right side. Specify voltage. 480 volts is standard; 208, 240, 380 and 575 volts are optional. 3 phase is standard; single phase is available. 60 or 50 Hertz. Heat Loss is total K.W. lost per hour at 1800°F/968°C. Heat Storage is the total K.W. it takes to heat furnace up to 1800°F/968°C. Multiply K.W. by 3412 to get BTUs. Heavier loading weights are optional. Tighter uniformity can be achieved by using a smaller portion of the work space. Specifications are subject to change without notice.

# OPTIONS

**VERTICAL DOORS:** Counterbalanced with hand crank, electric gear drive or pneumatic operator.

**PROGRAM CONTROLS:** Any make. Multi-program controls. Computer interfaced controls.

**TEMPERATURE RECORDERS**

**SCR POWER CONTROLS:** Single and multi-zone with biasing.

**NEMA 12 CONTROL PANEL:** With fused disconnect switch.

**SPECIAL HEARTHS:** Silicon Carbide and alloy, baskets, racks, roller hearths, special loading devices.

**VIEWING PORTS**

**VENTS AND VENTURIS:** Manual or pneumatic dampers, 300 and 600 CFM venturis for fast cooling.

**FANS:** Various fans for temperatures up to 2200°F for high uniformity and atmosphere distribution.

**ATMOSPHERE CONTROL:** Case is sealed for inert or combustible atmospheres. One option is nitrogen spiked with propane for high decarburization resistance. Alloy retorts for low dew point operation. Atmosphere control systems with safety systems to meet NFPA 86C.