LATTNER

*Safe·Sure·Simple*

**Cabinet Series**
Low and High Pressure Steam
7.5 KW to 3600 KW
25 to 12,420 Lb/Steam/Hr. 212°F

# Electric Steam Boilers

## applications:

LATTNER electric hot water boilers provide low or high pressure steam for economical space heating and humidification in commercial, industrial and institutional buildings. Also used to supply process steam for industrial use.

# construction details

**VESSEL CONSTRUCTION** - designed and constructed to ASME Code requirements. Low pressure steam boilers (15 psi maximum pressure relief valve setting) are designed in accordance with Section IV and "H" Stamped; high pressure steam boilers (pressures above 15 psi pressure relief valve setting) are designed in accordance with Section I and "S" Stamped. Vessels are registered with the National Borad and Data Reports are furnished.

**UL LISTING** - up to 3600 KW, 600V under File E 30432. For larger requirments, two or more units can be ganged together.

**ENCLOSURE** - heavy gauge control panel and vessel enclosure, attached to a welded steel frame mounted on a 4" channel base. All surfaces are protected against corrosion with heat resistant silicon acrylic enamel.

**INSULATION** - minimum 4" fiberglass on all sides of vessel.

**SAFETY VALVE** - ASME rated pressure relief valve(s) furnished with each boiler per ASME Code.

**HIGH PRESSURE CUTOUT** - Manual reset high pressure cutout deenergizes boiler in event of over-pressure condition per ASME CSD-1 Code.

**LOW WATER CUTOFF** - automatically deenergizes boiler in event of low water level. Can also be used to energize remote alarm or feedwater supply pump if required. Water column gauge glass with try cocks (optional) is provided.

**AUXILIARY LOW CUTOFF** - manual reset, probe type, installed as back up protection for primary automatic reset low water cutoff. Prevents unit from returning to service unless manual reset button is depressed.

**DRAIN/BLOWDOWN VALVE** - for periodic bottom cleaning and sediment removal.

**GAUGES** - pressure-indicating gauge with 31/2" dial is flush mounted on front panel of control cabinet for easy visibility.

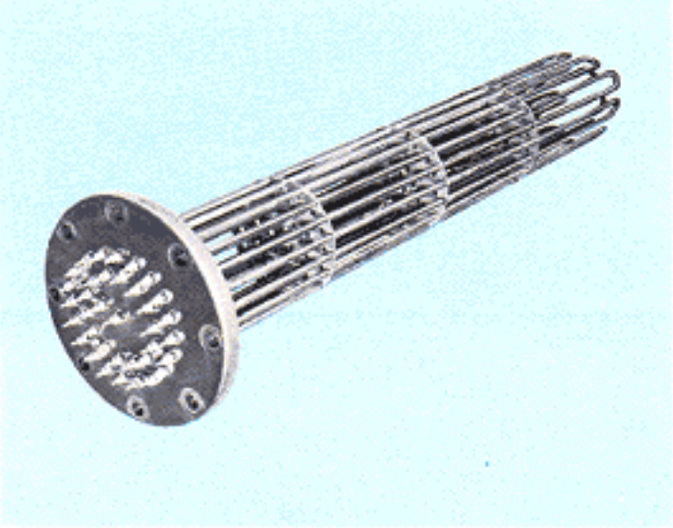
**CONTROLS** - boilers with three or more steps are furnished with modulating step controller; pressure sensor and recycling feature returns controller to off position after power failure. Boilers with 1 or 2 steps have appropriate number of heavy duty control pressure stats for close pressure control. All boilers are provided with desconnecting break magnetic contactors, fuses with 200,000 ampere interrupting capacity, 120V control transformer with fused primary and secondary, pilot lights for each step, control circuit switch with voltage indicator light and safety circuit monitor light.

**MAIN SUPPLY TERMINALS** - furnished for up to 600 MCM copper or aluminum supply conductors to accept a single electrical service. Above 600 MCM, multiple supplies will be used. Knockouts are provided at top of control panel as standard. Specify bottom or side location if required. See Rating Tables, Pages 6 and 7 for detailed supply conductor sizing.

# element bundle

Single U-bend Incoloy heating elements are minimally spaced 5/8" apart for maximum water circulation and heat transfer. Six inch cold pin and extra wide spacing add protection from hot spots under adverse water conditions when deposits build up over a period of time.

Elements are double sealed against moisture with an epoxy and silicone rubber seals. Element spacers add rigidity and prevent element damage under turbulent, high velocity water conditions. Individual elements are easily replaceable in boiler flange. Elements are rated 75 Watts per aquare inch maximum. Incoloy will withstand oxidation and scaling up to 1600F, as compared to 450F for copper. In actual use, Incoly has satisfactorily withstood superheated steam temperatures of 1500F in power plant boiler and 1150F as nuclear superheat fuel elements. The high temperature and corrosion resistance properties of these elements make them the most desirable elements for electric water heating. For other watt densities, consult representative.



# sample specification — Lattner steam boilers for space heating and process applications

1. Contractor to furnish and install UL Listed, Lattner electric boiler(s) with capacities and voltages as scheduled, equipped with incoloy sheathed elements mounted on standard ASA flanges.

2. Pressure vessel to be horizontally constructed per ASME Standards "H", "M" or "S" Stamp, as required, and registered with National Board of Boiler and Pressure Vessel Inspectors.

3. Heating elements shall be 15 KW maximum each, 75 Watts per square inch, single U-bend construction and shall be individually removable from flange. Element bundle shall be (left-hand)* removal. Furnish 6 inch cold pin in each element terminal and allow a 5/8" minimum clearance between elements. Subdivide load branch circuits into 48 amps maximum each. Elements to be wired with UL Listed 200°C conductors. *(Left hand standard, Right hand optional)

4. All controls to be prewired and functionally tested in integral ventilated control cabinet. Boilers with 1 or 2 steps shall have an equivalent number of heavy duty control pressuretrol to provide close pressure control; boilers with three or more steps are furnished with a modulating step controller, pressure sensor and recycling feature to return controller to off position after power failure.

5. Furnish 200,000 ampere interrupting capacity fuses for each heating element. Boilers with large numbers of steps may have fuses mounted on copper bus. Provide disconnecting break contractors, 120V control transformer with fused primary and secondary, pilot lights for each heating step, control circuit switch, control voltage indicator light and properly sized lugs for incoming conductors. Knockouts to be provided in top of control cabinet above line terminal lugs (alternates: right side, left side or bottom).

6. Boiler(s) to be complete with pressure relief valve(s) per ASME Code, automatic float-type low water cutoff, manual reset probe type auxiliary low water cutoff, pressure gauge flush-mounted in control cabinet, manual reset high pressure cutout, gauge glass, blowdown valve(s) and sight glass protector.

7. Pressure vessel to be insulated on all sides with 4" fiberglass blanket. Removable lifting lug(s) to be provided. Pressure vessel to be mounted on a 4" steel channel base with steel vessel enclosure and heavy ventilated NEMA 1 control cabinet. Provide hinged door with two-point, key-locking handle. All surfaces to be protected against corrosion with high temperature silicon enamel.

8. Optional features shall be as follows (select as required):

- Interlocking Nonfused Safety Disconnect
- Shunt Trip Mechanism
- Automatic Reset High Pressure Cutoff in Addition to Manual Reset
- Progressive Sequence Controller
- Door Interlock Switch
- Toggle Switches
- SCR Vernier Control
- Monitoring Terminals
- Surface Blowdown Skimmer (specify manual or auto blowdown)
- Auto Bottom Blowdown with Motorized Ball Valve
- Demand Limiter
- KW Load Limiter
- Ground Fault Protection System
- Blowdown Separator & Aftercooler
- Feedwater Solenoid
- Condensate Return System
- Steam Separator
- Ammeter (specify to monitor one or all three phases
- Voltmeter
- Make up Water Conditioner w/auto-regeneration

9. Manufacturer to provide one year warranty on all electrical control components, heating elements, and pressure vessel.

# technical data — KW required for steam boilers

1. To determine KW required for steam boilers, determine BTU/# of Steam from Table 1 according to temperature of feedwater and boiler working pressure (PSIG).
2. Determine KW by inserting BTU/# figure into formula below, according to lbs. of steam per hour required.

$$KW = \frac{(BTU/\#\ steam) \times (lbs.\ steam/hour\ required)}{3413}$$

## TABLE 1: BTU PER POUND OF STEAM

| Temp. of Feed-Water (°F.) | WORKING PRESSURE (PSIG) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 80 | 100 | 120 |
| 50° | 1138 | 1142 | 1146 | 1149 | 1152 | 1154 | 1158 | 1161 | 1164 | 1168 | 1172 | 1175 |
| 60° | 1128 | 1132 | 1136 | 1139 | 1142 | 1144 | 1148 | 1151 | 1154 | 1158 | 1162 | 1165 |
| 70° | 1118 | 1122 | 1126 | 1129 | 1132 | 1134 | 1138 | 1141 | 1144 | 1148 | 1152 | 1155 |
| 80° | 1108 | 1112 | 1116 | 1119 | 1122 | 1124 | 1128 | 1131 | 1134 | 1138 | 1142 | 1145 |
| 90° | 1098 | 1102 | 1106 | 1109 | 1112 | 1114 | 1118 | 1121 | 1124 | 1128 | 1132 | 1135 |
| 100° | 1088 | 1092 | 1096 | 1099 | 1102 | 1104 | 1108 | 1111 | 1114 | 1118 | 1122 | 1125 |
| 120° | 1068 | 1072 | 1076 | 1079 | 1082 | 1084 | 1088 | 1091 | 1094 | 1098 | 1102 | 1105 |
| 140° | 1048 | 1052 | 1056 | 1059 | 1062 | 1064 | 1068 | 1071 | 1074 | 1078 | 1082 | 1085 |
| 160° | 1028 | 1032 | 1036 | 1039 | 1042 | 1044 | 1048 | 1051 | 1054 | 1058 | 1062 | 1065 |
| 180° | 1008 | 1012 | 1016 | 1019 | 1022 | 1024 | 1028 | 1031 | 1034 | 1038 | 1042 | 1045 |
| 200° | 988 | 992 | 996 | 999 | 1002 | 1004 | 1008 | 1011 | 1014 | 1018 | 1022 | 1025 |
| 220° | 968 | 972 | 976 | 979 | 982 | 984 | 988 | 991 | 994 | 998 | 1002 | 1005 |
| 240° | 948 | 952 | 956 | 959 | 962 | 964 | 968 | 971 | 974 | 978 | 982 | 985 |
| 260° | 928 | 932 | 936 | 939 | 942 | 944 | 948 | 951 | 954 | 958 | 962 | 965 |

$KW = BHP \times 9.809$

$$KW = \frac{EDR}{14.2}$$

EDR = Equivalent Direct Radiation (Steam)

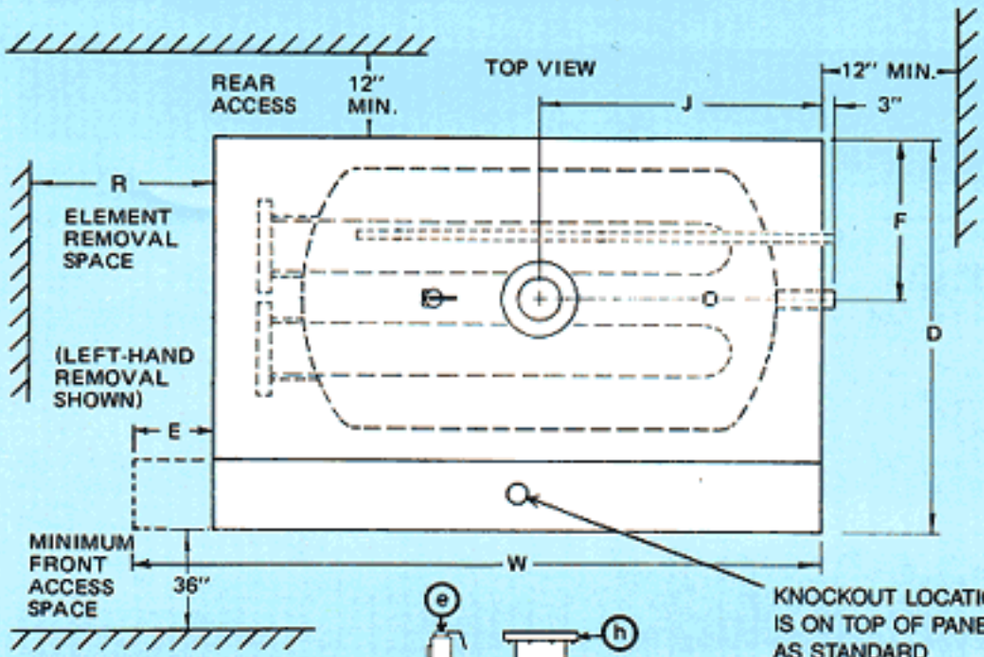
APPROX. STEAM PRESSURE VS. TEMPERATURE VALUES

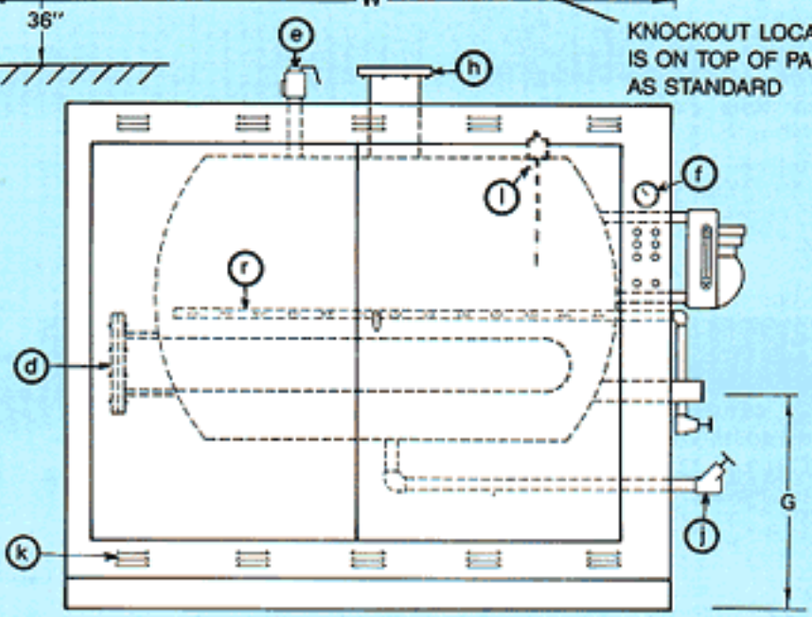
STEAM AT 0 PSIG 212°F.
STEAM AT 10 PSIG 240°F.
STEAM AT 15 PSIG 250°F.
STEAM AT 25 PSIG 267°F.
STEAM AT 35 PSIG 280°F.
STEAM AT 50 PSIG 298°F.
STEAM AT 75 PSIG 320°F.
STEAM AT 100 PSIG 338°F.
STEAM AT 125 PSIG 353°F.
STEAM AT 150 PSIG 366°F.

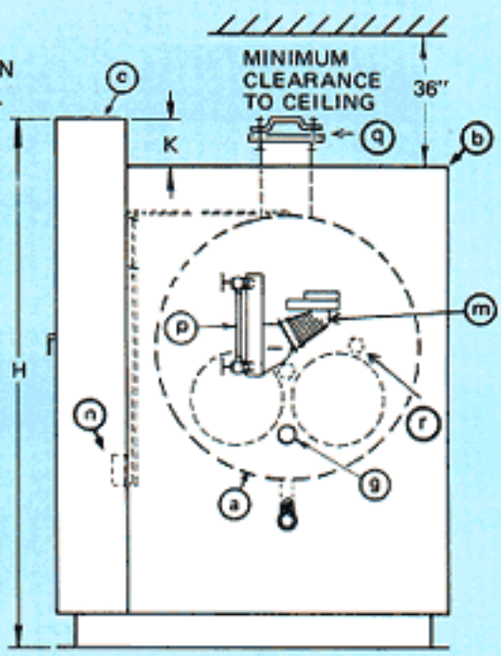
$$3\ Phase\ Amps = \frac{Watts}{Voltage \times 1.73}$$

$$1\ Phase\ Amps = \frac{Watts}{Voltage}$$

# dimensions — Lattner steam boilers




## STANDARD FEATURES

a. ASME BOILER VESSEL
b. BOILER ENCLOSURE
c. CONTROL PANEL
d. ELEMENTS
e. ASME PRESSURE RELIEF VALVE
f. PRESSURE GAUGE
g. INLET-CONDENSATE RETURN
h. OUTLET
j. DRAIN/BLOWDOWN VALVE
k. VENTILATION LOUVERS
l. AUXILIARY LOW WATER CUTOFF
m. LOW WATER CUTOFF
n. HIGH PRESSURE LIMIT CONTROLS
p. SIGHT GLASS
q. REMOVABLE LIFTING LUG
r. SURFACE BLOWDOWN (optional)

## TABLE 2: DIMENSIONS*, WEIGHTS AND CAPACITIES

| KW Range | Overall Size (inches) | | | | | Piping Size (inches) | | | Piping Location (inches) | | | Approx. Weight (pounds) | | Water Capacity (gallons) | Vessel Diameter (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | H | D | R | K | Return | Supply | Drain | F | G | J | Shipping | Operating | | |
| 7.5-60 | 50 | 40 | 32 | 24 | 6 | 1 TH | 2 TH | 1 | 12 | 15 | 21½ | 750 | 950 | 19 | 16 |
| 67.5-120 | 70 | 40 | 32 | 44 | 6 | 1 TH | 2 TH | 1 | 12 | 15 | 29½ | 950 | 1200 | 30 | 16 |
| 127-240 | 70 | 40 | 40 | 44 | 0 | 1 TH | 3 TH | 1 | 16 | 15 | 31 | 1700 | 2260 | 67 | 24 |
| 247-480 | 70 | 47 | 48 | 44 | 0 | 1¼ TH | 4 FL | 1¼ | 19 | 16 | 32 | 2300 | 3050 | 90 | 30 |
| 495-600 | 70 | 72 | 54 | 44 | 18 | 1¼ TH | 4 FL | 1¼ | 22 | 18 | 32 | 2500 | 3600 | 130 | 36 |
| 615-720 | 70 | 72 | 54 | 44 | 18 | 1¼ TH | 6 FL | 1¼ | 22 | 18 | 32 | 2600 | 3700 | 130 | 36 |
| 735-960 | 70 | 80 | 60 | 44 | 21 | 1¼ TH | 6 FL | 1½ | 25 | 18½ | 33 | 3400 | 5320 | 230 | 42 |
| 990-1277 | 96 | 80 | 60 | 64 | 21 | 2 TH | 6 FL | 1½ | 25 | 18½ | 44 | 5800 | 8300 | 300 | 42 |
| 1290-1596 | 96 | 80 | 68 | 64 | 15 | 2 TH | 8 FL | 1½ | 28 | 20 | 45 | 6200 | 9580 | 405 | 48 |
| 1620-1915 | 96 | 80 | 74 | 64 | 15 | 2 TH | 8 FL | 1½ | 31 | 22 | 45 | 7500 | 11750 | 510 | 54 |
| 1945-2100 | CONSULT FACTORY | | | | | 2 TH | 8 FL | 2 | | | | CONSULT FACTORY | | | |
| 2130-3300 | CONSULT FACTORY | | | | | 2 TH | 10 FL | 2 | | | | CONSULT FACTORY | | | |
| 3330-3600 | CONSULT FACTORY | | | | | 2 TH | 12 FL | 2 | | | | CONSULT FACTORY | | | |

* Dimensions based on standard horizontal 480/600 volt construction and may vary for vertical units, other voltages or units with optional features; accurate dimensions provided on certified prints.