SECTION 23 52 00

HEATING BOILERS AND ACCESSORIES

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\*\* NOTE TO SPECIFIER \*\* Electro Industries, Inc.; products.
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This section is based on the products of Electro Industries, Inc., which is located at:2150 W. River St., P. O. Box 538Monticello, MN 55362Toll Free Tel: 800-922-4138Tel: 763-295-4138 Fax: 763-295-4434Email: [request info (sales@electromn.com)](https://arcat.com/rfi?action=email&company=Electro%252BIndustries%252C%252BInc.&message=RE%253A%2520Spec%2520Question%2520(15510eii)%253A%2520&coid=47396&spec=15510eii&rep=&fax=763-295-4434)
Web: <http://www.electromn.com>
 [ [Click Here](https://arcat.com/company/electro-industries-inc-47396) ] for additional information.
Electro Industries has always had a strong desire to internally control all aspects of product control. We are unique in that we not only internally design our products, but we also fabricate our own sheet metal parts, with a welding department, circuit board assembly, and testing.
As a company, we are continually seeking ways to improve upon and create new products to help our customers better manage their comfort and energy needs.

1. GENERAL
	1. SECTION INCLUDES
		1. Electric boilers and accessories.
	2. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 22 05 00 - Common Work Results for Plumbing.
		2. Section 26 05 00 - Common Work Results for Electrical.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. Underwriters Laboratory (UL)
			1. UL 834 - Heating, Water Supply, and Power Boilers - Electric.
		2. Intertek's ETL Certification Program:
			1. ETL Listed
		3. American Society of Mechanical Engineers (ASME):
			1. ASME Boiler and Pressure Vessel Code Section IV , National Board
			2. CSD-1 - Controls and Safety Devices for Automatically Fired Boilers
		4. CRN
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data: Manufacturer's data sheets on each product to be used, including:
			1. Preparation instructions and recommendations.
			2. Storage and handling requirements and recommendations.
			3. Installation methods.
		3. Shop Drawings: Include system components, utility requirements and connections, relationship with adjacent construction. Include required clearances and access for servicing.
	2. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Minimum 5 years experience manufacturing similar equipment.
		2. Installer Qualifications: Minimum 2 years experience installing similar equipment.
		3. Standards: Boilers shall meet the requirements of the ASME Boiler and Pressure Vessel Code.
	3. DELIVERY, STORAGE, AND HANDLING
		1. Store products in manufacturer's unopened packaging until ready for installation.
	4. PROJECT CONDITIONS
		1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
	5. WARRANTY
		1. Manufacture's standard residential limited warranty with the following warranty periods:
			1. 2 year parts warranty.
			2. 20 year element warranty.
			3. 20 year boiler vessel warranty.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Electro Industries, Inc., which is located at:2150 W. River St., P. O. Box 538Monticello, MN 55362Toll Free Tel: 800-922-4138Tel: 763-295-4138 Fax: 763-295-4434Email: [request info (sales@electromn.com)](https://arcat.com/rfi?action=email&company=Electro%252BIndustries%252C%252BInc.&message=RE%253A%2520Spec%2520Question%2520(15510eii)%253A%2520&coid=47396&spec=15510eii&rep=&fax=763-295-4434);Web: <http://www.electromn.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Our radiant electric boilers along with a radiant tubing system, have become one of the most popular heating systems for residential applications. These systems offer the comfort of radiant heat and the cost savings and safety offered by using our electric boilers. Delete if not required.

* 1. SMALL ELECTRIC BOILERS

\*\* NOTE TO SPECIFIER \*\* When properly designed and installed, cost savings can be seen from 20% to 40 % over conventional forced-air heating. Radiant floor heating will eliminate cold, drafty rooms. It will also get to the hard to reach areas. Radiant systems provide comfort that is unsurpassed. All radiant systems are not the same. Electro Industries understands the design and installation of a quality radiant application. We bring that knowledge to every manufactured product. Delete if not required.

* + 1. Mini-Size Boiler:
			1. Compact wall mounted radiant floor heating boiler
			2. Product: EMB Series Radiant Floor Mini-Boiler as manufactured by Electro Industries Inc.

\*\* NOTE TO SPECIFIER \*\* EMB-S temperature range 90 degree F to 160 degree F (32 degree C to 71 degree C), EMB-H temperature range 90 degree F to 180 degree F (32 degree C to 82 degree C) with narrower temperature modulation. Delete model not required.

* + - 1. Model: EMB-S-1, 120 V, 1,100 W, 9 A, 1.1 kW, 1-60 phase, 3,700 Btu/h, CB N/A.
			2. Model: EMB-S-2, 120 V, 2,500 W, 21 A, 2.5 kW, 1-60 phase, 8,500 Btu/h, CB N/A.
			3. Model: EMB-S-4, 120 V, 5,000 W, 42 A, 5 kW, 1-60 phase, 17,000 Btu/h, CB N/A.
			4. Model: EMB-S-5, 240 V, 4,500 W, 19 A, 4.5 kW, 1-60 phase, 15,300 Btu/h, CB 30A.
			5. Model: EMB-S-7, 240 V, 7,000 W, 29 A, 7 kW, 1-60 phase, 23,800 Btu/h, CB 45A.
			6. Model: EMB-S-9, 240 V, 9,000 W, 38 A, 9 kW, 1-60 phase, 30,700 Btu/h, CB 60A.
			7. Model: EMB-H-1, 120 V, 1,100 W, 9 A, 1.1 kW, 1-60 phase, 3,800 Btu/h, CB N/A.
			8. Model: EMB-H-2, 120 V, 2,500 W, 21 A, 2.5 kW, 1-60 phase, 8,500 Btu/h, CB N/A.
			9. Model: EMB-H-4, 120 V, 5,000 W, 42 A, 5 kW, 1-60 phase, 17,000 Btu/h, CB N/A.

\*\* NOTE TO SPECIFIER \*\* EMB-H models includes SSR.

* + - 1. Model: EMB-H-5, 240 V, 4,500 W, 19 A, 4.5 kW, 1-60 phase, 15,300 Btu/h, CB 30A.
			2. Model: EMB-H-7, 240 V, 7,000 W, 29 A, 7 kW, 1-60 phase, 23,800 Btu/h, CB 45A.
			3. Model: EMB-H-9, 240 V, 9,000 W, 38 A, 9 kW, 1-60 phase, 30,700 Btu/h, CB 60A.
			4. Dimension (WxHxD): 11 x 25 x 9 inches (279 x 635 x 229 mm).
			5. Capacity: 0.95 gal (3.60 L) vessel.
			6. Construction:
				1. Heavy duty sheet metal enclosure.
				2. Built-in supply pressure/temperature gauge.
				3. Safety relief valve 30 psi (207 kPa).
				4. Built-in supply water sensing.
				5. Inlet and Outlet Connections: 3/4 inch MPT.
				6. Built in accordance with ASME Section IV and registered with the national board, under A.14.e.
			7. Controls:
				1. Control wiring terminals.
				2. LED indicator lights.
				3. DC Power Relays.
				4. Hi-Limits:

1st: Automatic reset at 190 degrees F (88 degrees C).

2nd: Manual reset at 205 degrees F (96 degrees C).

* + - * 1. Circulator Switching Relay: 10 amp maximum.
				2. Thermostat or end switch connection (R and W).
				3. Load management control provisions.
				4. EMB-H model includes SSR.

\*\* NOTE TO SPECIFIER \*\* This model is designed for multiple temperature and zoning applications. This model has the ability to sense water temperature and maintain an accurate boiler temperature output by only energizing the electric elements for needed output (not full capacity). This model eliminates extra costs associated with relays, extra temperature controls, zone boxes, etc. Our more experienced installers use this boiler to avoid the extra cost of the above components. Delete if not required.

* + - 1. Mini-Boiler WarmFlo:
				1. Adjustable outlet water temperature control.
				2. EMB-S temperature set point: 90 to 160 degrees F (32 to 71 degrees C) in 10 degree increments.
				3. EMB-H temperature set point: 90 to 180 degrees F (32 to 82 degrees C) in 12 degree increments.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Midsize Electric Boiler:
			1. Product: EB - TS Series Radiant Floor Midsize Boiler as manufactured by Electro Industries Inc.

\*\* NOTE TO SPECIFIER \*\* Delete model not required.

* + - 1. Model: EB-M-10, 240 V, 10,000 W, 41.66 A, 10 kW, 1-60 Phase, 34,100 Btu/h, 60 CB.
			2. Model: EB-M-12, 240 V, 11,500 W, 48 A, 11.5 kW, 1-60 Phase, 39,200 Btu/h, 60 CB.
			3. Model: EB-M-15, 240 V, 15,000 W, 62.50 A, 15 kW, 1-60 Phase, 51,100 Btu/h, 60 and 30 CB.
			4. Model: EB-M-17, 240 V, 17,500 W, 62.50 A, 17.5 kW, 1-60 Phase, 59,700 Btu/h, 60 and 45 CB.
			5. Model: EB-M-20, 240 V, 20,000 W, 83.33 A, 20 kW, 1-60 Phase, 68,200 Btu/h, 60 and 60 CB.

\*\* NOTE TO SPECIFIER \*\* In our 25 plus years of manufacturing boilers, our latest TS Series boiler design offers many benefits that were not previously offered in an electric boiler. The TS Series (EB-MS-\*\*) allows you the flexibility to accomplish any radiant in-floor need.

* + - 1. Series: Midsize EB-MS.
				1. Supply water sensing.
				2. Regulates to front panel selected temperature.
				3. Temperature Set Point Range: 90 to 170 degrees F (32 to 77 degrees C).
				4. Staging indicator lights.
				5. DC Power Relays.
				6. Hi-Limits:

1st: Automatic reset 190 degrees F (88 degrees C).

2nd: Manual reset 205 degrees F (96 degrees C).

* + - * 1. Circulator Switching Relay: 10 amp maximum.
				2. Utility load control provisions.
				3. Steel Vessel: 2.2 gal (8.3 L). ASME "H" Stamp.
				4. Inlet and Outlet Connection: 1 inch MPT.
				5. Built in accordance with ASME Section IV and registered with the national board, under A.14.e.
				6. Supply temperature/pressure gauge.
				7. Safety Relief Valve: 30 psi (207 kPa).

\*\* NOTE TO SPECIFIER \*\* Optional. Delete if not required.

* + - * 1. Standby boiler control, standby switch and boiler contact.

\*\* NOTE TO SPECIFIER \*\* Our most deluxe model is designed for multiple temperature and zoning applications. This model has the ability to sense water temperature and maintain an accurate boiler temperature output by only energizing the electric elements for needed output (not full capacity). This model eliminates extra costs associated with relays, extra temperature controls, zone boxes, etc. Our more experienced installers use this boiler to avoid the extra cost of the above. Delete if not required.
\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Series: Midsize EB-MX.
				1. Supply water sensing.
				2. Regulates to front panel selected temperature.
				3. Temperature Set Point Range: 90 to 180 degrees F (32 to 82 degrees C),
				4. Staging indicator lights.
				5. DC Power Relays.
				6. Hi-Limits:

1st: Automatic reset 190 degrees F (88 degrees C).

2nd: Manual reset 205 degrees F (96 degrees C).

* + - * 1. Circulator Switching Relay: 10 amp maximum.
				2. Utility load control provisions.
				3. Steel Vessel: 2.2 gal (8.3 L). ASME "H" Stamp. Built in accordance with ASME Section IV and registered with the national board, under A.14.e.
				4. Supply temperature/pressure gauge.
				5. Safety Relief Valve: 30 psi (207 kPa).
				6. Modulates at a tighter temperature control.
				7. Standby boiler control, standby switch and boiler contact.
				8. Outdoor temperature sensing with outdoor reset capability. The target supply temperature ramps up as it is colder outside.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* 1. STANDARD ELECTRIC BOILERS

\*\* NOTE TO SPECIFIER \*\* In our 25 plus years of manufacturing boilers, our latest TS Series boiler design offers many benefits that were not previously offered in an electric boiler. The TS Series allows you the flexibility to accomplish any radiant in-floor need. Delete if not required.

* + 1. Standard Size Electric Boilers:
			1. Product: EB - TS Series Radiant Floor Standard Boiler as manufactured by Electro Industries Inc.

\*\* NOTE TO SPECIFIER \*\* Delete model not required.

* + - 1. Model: EB-xx-13, 240 V, 13,500 W, 56 A, 13.5 kW, 1-60 Phase, 46,000 Btu/h, 60 and 30 CB.
			2. Model: EB-xx-18, 240 V, 18,000 W, 75 A, 18 kW, 1-60 Phase, 61,400 Btu/h, 60 and 60 CB.
			3. Model: EB-xx-23, 240 V, 22,500 W, 94 A, 22.5 kW, 1-60 Phase, 76,792 Btu/h, 60 and 60 and 30 CB.
			4. Model: EB-xx-27, 240 V, 27,000 W, 113 A, 27 kW, 1-60 Phase, 92,151 Btu/h, 60 and 60 and 60 CB.
			5. Model: EB-WX-13-2, 208 V, 13,500 W, 37.5 A, 13.5 kW, 3-60 Phase, 46,075 Btu/h, 50 CB.
			6. Model: EB-WX-27-2, 208 V, 27,000 W, 75 A, 27 kW, 3-60 Phase, 92,151 Btu/h, 100 CB.

\*\* NOTE TO SPECIFIER \*\* In our 25 plus years of manufacturing boilers, our latest TS Series boiler design offers many benefits that were not previously offered in an electric boiler. The TS Series allows you the flexibility to accomplish any radiant in-floor need.

* + - 1. Series: TS Series Staging S.
				1. Supply water sensing.
				2. Regulates to front panel selected temperature.
				3. Temperature Set Point Range: 90 to 170 degrees F (32 to 77 degrees C).
				4. Staging indicator lights.
				5. DC Power Relays.
				6. Hi-Limits:

1st: Automatic reset 190 degrees F (88 degrees C).

2nd: Manual reset 205 degrees F (96 degrees C).

* + - * 1. Circulator Switching Relay: 10 amp maximum.
				2. Utility load control provisions.
				3. Steel Vessel: 6.5 gal (24.6 L). ASME "H" Stamp. Built in accordance with ASME Section IV and registered with the national board, under A.14.e.
				4. Supply temperature/pressure gauge.
				5. Safety Relief Valve: 30 psi (207 kPa).

\*\* NOTE TO SPECIFIER \*\* Optional. Delete if not required.

* + - * 1. Standby boiler control, standby switch and boiler contact.

\*\* NOTE TO SPECIFIER \*\* Our most deluxe model is designed for multiple temperature, high temperature, and zoning applications. This model has the ability to sense water temperature and maintain an accurate boiler temperature output by only energizing the electric elements for needed output (not full capacity). This model eliminates extra costs associated with relays, extra temperature controls, zone boxes, etc. Our more experienced installers use this boiler to avoid the extra cost of the above. Same as EB-S-\*\* PLUS Modulates at a tighter temperature control and Standby control package. Delete if not required.
\*\* NOTE TO SPECIFIER \*\* Same as EB-WA-\*\* PLUS Outdoor sensing with outdoor reset capability. The target supply temperature ramps up as it is colder outside. Delete if not required.

* + - 1. Series: TS WX Series
				1. Supply water sensing.
				2. Regulates to front panel selected temperature.
				3. Temperature Set Point Range: 90 to 180 degrees F (32 to 82 degrees C)
				4. Staging indicator lights.
				5. DC power relays.
				6. Hi-Limits:

1st: Automatic reset 190 degrees F (88 degrees C).

2nd: Manual reset 205 degrees F (96 degrees C).

* + - * 1. Circulator Switching Relay: 10 amp maximum.
				2. Utility load control provisions.
				3. 6.5 gal (24.6 L) Steel vessel ASME "H" Stamp. Built in accordance with ASME Section IV and registered with the national board, under A.14.e.
				4. Supply temperature/pressure gauge.
				5. Safety Relief Valve: 30 psi (207 kPa).
				6. Modulates at a tighter temperature control.
				7. Standby boiler control, standby switch and boiler contact.
				8. Outdoor temperature sensing with outdoor reset capability. The target supply temperature ramps up as it is colder outside.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* 1. LARGE ELECTRIC BOILERS

\*\* NOTE TO SPECIFIER \*\* Designed for larger hydronic heating applications, our "C" series boilers offer many new features. Available in many voltages and capacities, our temperature sensing, relay staging and vessel configuration offer quiet operation, minimal relay cycling, consistent temperature output and most of all product reliability.

* + 1. Large Electric Boiler:
			1. Product: TS CX Series Radiant Floor Midsize Boiler as manufactured by Electro Industries Inc.

\*\* NOTE TO SPECIFIER \*\* Delete model not required.

* + - 1. Model: EB-CX-18-60, 600 V, 18,000 W, 18 A, 18 kW, 3-60 Phase, 61,400 Btu/h, 30 CB.
			2. Model: EB-CX-24-60, 600 V, 24,000 W, 24 A, 24 kW, 3-60 Phase, 81,800 Btu/h, 40 CB.
			3. Model: EB-CX-30-60, 600 V, 30,000 W, 29 A, 30 kW, 3-60 Phase, 102,300 Btu/h, 50 CB.
			4. Model: EB-CX-36-60, 600 V, 36,000 W, 35 A, 36 kW, 3-60 Phase, 122,800 Btu/h, 60 CB.
			5. Model: EB-CX-45-60, 600 V, 45,000 W, 44 A, 45 kW, 3-60 Phase, 153,500 Btu/h, 70 CB.
			6. Model: EB-CX-54-60, 600 V, 54,000 W, 52 A, 54 kW, 3-60 Phase, 184,200 Btu/h, 80 CB.
			7. Model: EB-CX-18-48, 480 V, 18,000 W, 22 A, 18 kW, 3-60 Phase, 61,400 Btu/h, 30 CB.
			8. Model: EB-CX-24-48, 480 V, 24,000 W, 29 A, 24kW, 3-60 Phase, 81,800 Btu/h, 40 CB.
			9. Model: EB-CX-30-48, 480 V, 30,000 W, 37 A, 30kW, 3-60 Phase, 102,300 Btu/h, 50 CB.
			10. Model: EB-CX-36-48, 480 V, 36,000 W, 44 A, 36 kW, 3-60 Phase, 122,800 Btu/h, 60 CB.
			11. Model: EB-CX-42-48, 480 V, 36,000 W, 51 A, 42 kW, 3-60 Phase, 143,300 Btu/h, 70 CB.
			12. Model: EB-CX-48-48, 480 V, 48,000 W, 58 A, 48 kW, 3-60 Phase, 163,700 Btu/h, 80 CB.
			13. Model: EB-CX-54-48, 480 V, 54,000 W, 65 A, 54 kW, 3-60 Phase, 184,200 Btu/h, 80 CB.
			14. Model: EB-CX-27-20, 208 V, 27,000 W, 75 A, 27 kW, 3-60 Phase, 92,100 Btu/h, 100 CB.
			15. Model: EB-CX-31-20, 208 V, 31,500 W, 88 A, 31.5 kW, 3-60 Phase, 107,400 Btu/h, 110 CB.
			16. Model: EB-CX-36-20, 208 V, 36,000 W, 100 A, 36 kW, 3-60 Phase, 122,800 Btu/h, 125 CB.
			17. Model: EB-CX-40-20, 208 V, 40,500 W, 113 A, 40.5 kW, 3-60 Phase, 138,100 Btu/h, 150 CB.
			18. Model: EB-CX-27-24, 240 V, 27,000 W, 65 A, 27 kW, 3-60 Phase, 92,100 Btu/h, 80 CB.
			19. Model: EB-CX-31-24, 240 V, 31,500 W, 76 A, 31.5 kW, 3-60 Phase, 107,400 Btu/h, 100 CB.
			20. Model: EB-CX-36-24, 240 V, 36,000 W, 87 A, 36 kW, 3-60 Phase, 122,800 Btu/h, 110 CB.
			21. Model: EB-CX-40-24, 240 V, 40,500 W, 98 A, 40.5 kW, 3-60 Phase, 138,100 Btu/h, 125 CB.
			22. Model: EB-CX-31, 240 V, 31,500 W, 132 A, 31.5 kW, 1-60 Phase, 107,400 Btu/h, 100 and 80 CB.
			23. Model: EB-CX-36, 240 V, 36,000 W, 150 A, 36 kW, 1-60 Phase, 122,800 Btu/h, 100 and 100 CB.
			24. Model: EB-CX-40, 240 V, 40,000 W, 167 A, 40 kW, 1-60 Phase, 136,400 Btu/h, 125 and 125 CB.
			25. Model: EB-CX-44, 240 V, 44,000 W, 184 A, 44 kW, 1-60 Phase, 150,100 Btu/h, 125 and 125 CB.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.
\*\* NOTE TO SPECIFIER \*\* Same as EB-CA-\*\* PLUS adds outdoor reset capability

* + - 1. Series: Staging - EB-CX.
				1. Supply water sensing.
				2. Regulates to front panel selected temperature.
				3. Staging indicator lights.
				4. Heavy duty contactors.
				5. Hi-Limits:

1st: Automatic reset 190 degrees F (88 degrees C).

2nd: Manual reset 205 degrees F (96 degree sC).

* + - * 1. Circulator switching relay: 10 amp maximum.
				2. Thermostat or end switch connection (R and W).
				3. Utility load control provisions.
				4. Steel Vessel: 12 gal (45.4 L) ASME "H" Stamp. Built in accordance with ASME Section IV and registered with the national board, under A.14.e.
				5. Supply temperature/pressure gauge.
				6. Safety Relief Valve: 30 psi (207 kPa).
				7. Outdoor reset capability.
				8. Standby boiler control, standby switch and boiler contact.
				9. Outdoor sensing with outdoor reset capability. The target supply temperature ramps up as it is colder outside.

\*\* NOTE TO SPECIFIER \*\* Electro Industries' Industrial boilers are a very compact and an effective solution to retrofitting old, inefficient fossil fuel boilers, or for use in new installations. Delete if not required.

* 1. INDUSTRIAL ELECTRIC BOILERS
		1. Industrial Electric Boiler:
			1. Product: EB-NB Industrial Boilers as manufactured by Electro Industries, Inc.
			2. Description:
				1. Wiring within the main cabinet shall be rated at 167 degrees F (75 degrees C) or higher. Aluminum or copper conductors shall be used for field installed power wiring. The boiler shall include provisions to connect directly to utility load control. The boiler shall include a dedicated 15 A 120 V single phase control circuit (general service).

\*\* NOTE TO SPECIFIER \*\* As a preferred option the boiler (dependent upon kW). Delete if not required.

* + - * 1. Boiler shall be wired using (2) three phase delta feeds without neutral (unbounded neutral) within the dedicated utility transformer XO terminal. All Delta 3-phase require optional Bender fault monitor.
				2. The vessel shall be wrapped with 3 inches (76 mm) insulation. The vessel shall be enclosed in a 14 gauge (1.9 mm) fully enclosed cabinet. The cabinet and vessel shall be attached to a 10 gauge (3.4 mm) structural steel base. The base includes integral fork pockets for easy maneuvering during installation. Both base and cabinet shall be painted with powder coated enamel. The cabinet shall include a full length hinged door with an included lockable T-handle. The inside dead front panel shall include an integral door safety interlock switch.
				3. The vessel shall have a capacity of 40 gallons (151.4 L). The vessel shall be "H" stamped and National Board registered with a maximum working pressure of 30 psi (207 kPa) or 125 psi (862 kPa). The Vessel shall have 3 inches (76 mm) NPT threaded inlet and outlet nozzles. The outlet nozzle shall be located on the top of the vessel. The inlet nozzle shall be located on the left side of the vessel.
				4. The immersion heating elements shall be installed in the top of the vessel and threaded into vessel for easy servicing (water draw-down not required). The heating elements shall be constructed using incoloy sheathing for long service life. The low-watt density heating elements shall be 30 inches (762 mm) in length. The cabinet shall have a split cover top for easy access to the heating elements. Contactors used to operate the heating elements shall be rated for 500,000 cycles.
				5. The boiler shall include mounted control enclosure. The control enclosure shall contain all boiler controls and adjustments. Operator is not required to enter main cabinet for resets or other functions. A window shall be included on the door of the control enclosure to permit viewing of monitor and alarm LEDs. The control assembly shall include a six function alarm LED. The sequencer shall include provisions for stage rotation.

\*\* NOTE TO SPECIFIER \*\* Option. Delete if not required.

* + - * 1. An emergency stop switch shall be included in the control assembly.
				2. The boiler shall include a 5 year limited warranty on the vessel and a 1 year limited warranty on the parts. The boiler shall be fully tested using standard UL 834.

\*\* NOTE TO SPECIFIER \*\* Option. Delete if not required.

* + - * 1. EB-N-GFM-KIT - Ground Fault Monitor: Provide for installations utilizing a dedicated utility transformer designed to be used as a 3-wire Delta service, with unbonded neutral.

\*\* NOTE TO SPECIFIER \*\* Option. Delete if not required.

* + - * 1. 5600 - Honeywell, T775R. Provide electronic stand-alone operating control.

\*\* NOTE TO SPECIFIER \*\* Delete model not required.

* + - 1. Model: EB-NB-60-600, 600 V, 60 kW, 57.7 A, 5 elements at 12 kW, 204,728 Btu/h, 4 to 21 gpm flow rate at 20 degrees F delta T, 685 Ib (310 kg) boiler weight.
			2. Model: EB-NB-72-600, 600 V, 72 kW, 69.3 A, 6 elements at 12 Kw, 245,674 Btu/h, 4 to 25 gpm flow rate at 20 degrees F delta T, 690 lb (312 kg) boiler weight.
			3. Model: EB-NB-84-600, 600 V, 84 kW, 80.8 A, 7 elements at 12 Kw, 286,619 Btu/h, 4 to 29 gpm flow rate at 20 degrees F delta T, 695 lb (313 kg) boiler weight.
			4. Model: EB-NB-96-600, 600 V, 96 kW, 92.4 A 8 elements at 12 kW, 327,565 Btu/h, 4 to 33 gpm flow rate at 20 degrees F delta T, 700 Ib (317 kg) boiler weight.
			5. Model: EB-NB-108-600, 600 V, 108 kW, 103.9 A, 9 elements at 12 Kw, 368,511 Btu/h, 4 to 37 gpm flow rate at 20 degrees F delta T, 705 lb (320 kg) boiler weight.
			6. Model: EB-NB-120-600, 600 V, 120 kW, 115.5 A, 10 elements at 12 Kw, 409,457 Btu/h, 4 to 41 gpm flow rate at 20 degrees F delta T, 710 lb (322 kg) boiler weight.
			7. Model: EB-NB-132-600, 600 V, 132 kW, 127 A, 11 elements at 12 kW, 450,402 Btu/h, 4 to 45 gpm flow rate at 20 degrees F delta T, 715 Ib (324 kg) boiler weight.
			8. Model: EB-NB-144-600, 600 V, 144 kW,138.6 A, 12 elements at 12 Kw, 491,348 Btu/h, 4 to 50 gpm flow rate at 20 degrees F delta T, 720 lb (326 kg) boiler weight.
			9. Model: EB-NB-160-600, 600 V, 160 kW, 154.0 A, 8 elements at 20 Kw, 546,942 Btu/h, 7 to 55 gpm flow rate at 20 degrees F delta T, 700 lb (317 kg) boiler weight.
			10. Model: EB-NB-180-600, 600 v, 180 kW, 96.2 A, 9 elements at 20 kW, 614,185 Btu/h, 7 to 62 gpm flow rate at 20 degrees F delta T, 705 Ib (320 kg) boiler weight.
			11. Model: EB-NB-200-600, 600 V, 200 kW, 192.5 A, 10 elements at 20 Kw, 682,428 Btu/h, 7 to 69 gpm flow rate at 20 degrees F delta T, 710 lb (322 kg) boiler weight.
			12. Model: EB-NB-220-600, 600 V, 220 kW, 211.7 A, 11 elements at 20 kW, 750,671 Btu/h, 7 to 76 gpm flow rate at 20 degrees F delta T, 715 Ib (324 kg) boiler weight.
			13. Model: EB-NB-240-600, 600 V, 240 kW, 230.9 A, 12 elements at 20 Kw, 819,914 Btu/h, 7 to 82 gpm flow rate at 20 degrees F delta T, 720 lb (326 kg) boiler weight.
			14. Model: EB-NB-260-600, 600 V, 260 kW, 250.2 A, 13 elements at 20 kW, 887,156 Btu/h, 7 to 89 gpm flow rate at 20 degrees F delta T, 725 Ib (329 kg) boiler weight.
			15. Model: EB-NB-280-600, 600 V, 280 kW, 269.4 A, 14 elements at 20 kW, 955,400 Btu/h, 7 to 96 gpm flow rate at 20 degrees F delta T, 730 Ib (331 kg) boiler weight.
			16. Model: EB-NB-280-600H, 600 V, 278 kW, 267.5 A, 7 elements at 20 kw and 6 elements at 23 kW, 948,575 Btu/h, 7 to 95 gpm flow rate at 20 degrees F delta T, 725 Ibs (329 kg) boiler weight
			17. Model: EB-NB-300-600, 600 V, 300 kW, 288.7 A, 15 elements at 20 Kw, 1,023,642 Btu/h, 7 to 103 gpm flow rate at 20 degrees F delta T, 735 lb (333 kg) boiler weight.
			18. Model: EB-NB-300-600H, 600 v, 299 kW, 287.7 A, 13 elements at 23 kW, 1,020,230 Btu/h, 7 to 102 gpm flow rate at 20 degrees F delta T, 725 Ib (329 kg) boiler weight.
			19. Model: EB-NB-60-480, 480 V, 60 kW, 72.2 A, 5 elements at 12 kW, 204,728 Btu/h, 4 to 21 gpm flow rate at 20 degrees F delta T, 685 Ib (311 kg) boiler weight.
			20. Model: EB-NB-72-480, 480 V, 72 kW, 86.6 A, 6 elements at 12 kW, 245,674 Btu/h, 4 to 25 gpm flow rate at 20 degrees F delta T, 690 Ib (313 kg) boiler weight.
			21. Model: EB-NB-84-480, 480 V, 84 kW, 101.0 A, 7 elements at 12 Kw, 286,619 Btu/h, 4 to 29 gpm flow rate at 20 degrees F delta T, 695 lb (313 kg) boiler weight.
			22. Model: EB-NB-96-480, 480 V, 96 kW, 115.5 A, 8 elements at 12 kW, 327,565 Btu/h, 4 to 33 gpm flow rate at 20 degrees F delta T, 700 Ib (317 kg) boiler weight.
			23. Model: EB-NB-108-480, 480 V, 108 kW, 129.9 A, 9 elements at 12 Kw, 368,511 Btu/h, 4 to 37 gpm flow rate at 20 degrees F delta T, 705 lb (320 kg) boiler weight.
			24. Model: EB-NB-120-480, 480 V, 120 kW,144.3 A, 10 elements at 12 Kw, 409,457 Btu/h, 4 to 41 gpm flow rate at 20 degrees F delta T, 710 lb (322 kg) boiler weight.
			25. Model: EB-NB-132-480, 480 V, 132 kW, 158.8 A, 11 elements at 12 kW, 450,402 Btu/h, 4 to 45 gpm flow rate at 20 degrees F delta T, 715 Ib (324 kg) boiler weight.
			26. Model: EB-NB-144-480, 480 V, 144 kW, 173.2 A, 12 elements at 12 Kw, 491,348 Btu/h, 4 to 50 gpm flow rate at 20 degrees F delta T, 720 lb (326 kg) boiler weight.
			27. Model: EB-NB-160-480, 480 V, 160 kW,192.5 A, 8 elements at 20 Kw, 546,942 Btu/h, 7 to 55 gpm flow rate at 20 degrees F delta T, 700 lb (317 kg) boiler weight.
			28. Model: EB-NB-180-480, 480 V, 180 kW, 216.5 A, 9 elements at 20 kW, 614,185 Btu/h, 7 to 62 gpm flow rate at 20 degrees F delta T, 705 Ib (320 kg) boiler weight.
			29. Model: EB-NB-200-480, 480 V, 200 kW, 240.6 A, 10 elements at 20 Kw, 682,428 Btu/h, 7 to 69 gpm flow rate at 20 degrees F delta T, 710 lb (322 kg) boiler weight.
			30. Model: EB-NB-220-480, 480 V, 220 kW, 264.6 A, 11 elements at 20 kW, 750,671 Btu/h, 7 to 76 gpm flow rate at 20 degrees F delta T, 715 Ib (324 kg) boiler weight.
			31. Model: EB-NB-240-480, 480 V, 240 kW, 288.7 A, 12 elements at 20 Kw, 819,914 Btu/h, 7 to 82 gpm flow rate at 20 degrees F delta T, 720 lb (326 kg) boiler weight.
			32. Model: EB-NB-260-480, 480 V, 260 kW, 312.7 A, 13 elements at 20 kW, 887,156 Btu/h, 7 to 89 gpm flow rate at 20 degrees F delta T, 725 Ib (329 kg) boiler weight.
			33. Model: EB-NB-280-480, 480 V, 280 kW, 336.8 A, 14 elements at 20 kW, 955,400 Btu/h, 7 to 96 gpm flow rate at 20 degrees F delta T, 730 Ib (331 kg) boiler weight.
			34. Model: EB-NB-280-480H, 480 V, 280 kW, 334.4 A, 7 elements at 20 kW and 6 elements at 23 kW, 948,575 Btu/h, 7 to 95 gpm flow rate at 20 degrees F delta T, 725 Ib (329 kg) boiler weight.
			35. Model: EB-NB-300-480, 480 V, 300 kW, 360.8 A, 15 elements at 20 Kw, 1,023,642 Btu/h, 7 to 103 gpm flow rate at 20 degrees F delta T, 735 lb (333 kg) boiler weight.
			36. Model: EB-NB-300-480H, 480 V, 299 kW, 359.6 A, 13 elements at 23 kW, 1,020,230 Btu/h, 7 to 102 gpm flow rate at 20 degrees F delta T, 725 Ib (329 kg) boiler weight.
			37. Model: EB-NB-60-208, 208 V, 60 kW,166.5 A, 4 elements at 15 Kw, 204,728 Btu/h, 5 to 21 gpm flow rate at 20 degrees F delta T, 680 lb (308 kg) boiler weight.
			38. Model: EB-NB-75-208, 208 V, 75 kW, 208.2 A, 5 elements at 15 Kw, 255,910 Btu/h, 5 to 26 gpm flow rate at 20 degrees F delta T, 685 lb (311 kg) boiler weight.
			39. Model: EB-NB-90-208, 208 V, 90 kW, 249.8 A, 6 elements at 15 kW, 307,092 Btu/h, 5 to 31 gpm flow rate at 20 degrees F delta T, 690 Ib (313 kg) boiler weight.
			40. Model: EB-NB-105-208, 208 V, 105 kW, 291.5 A, 7 elements at 15 Kw, 358,274 Btu/h, 5 to 36 gpm flow rate at 20 degrees F delta T, 695 lb (315 kg) boiler weight.
			41. Model: EB-NB-120-208, 208 V, 120 kW, 333.1 A, 8 elements at 15 kW, 409,457 Btu/h, 5 to 41 gpm flow rate at 20 degrees F delta T, 700 Ib (317 kg) boiler weight.
			42. Model: EB-NB-135-208, 208 V, 135 kW, 374.7 A, 9 elements at 15 kW, 460,639 Btu/h, 5 to 47 gpm flow rate at 20 degrees F delta T, 705 Ib (320 kg) boiler weight.
			43. Model: EB-NB-150-208, 208 V, 150 kW, 416.4 A, 10 elements at 15 Kw, 511,821 Btu/h, 5 to 52 gpm flow rate at 20 degrees F delta T, 710 lb (322 kg) boiler weight.
			44. Model: EB-NB-165-208, 208 V, 165 kW, 458.0 A, 11 elements at 15 kW, 563,003 Btu/h, 5 to 57 gpm flow rate at 20 degrees F delta T, 715 Ib (324 kg) boiler weight.
			45. Model: EB-NB-180-208, 208 V, 180 kW, 499.6 A, 12 elements at 15 Kw, 614,185 Btu/h, 5 to 62 gpm flow rate at 20 degrees F delta T, 720 lb (326 kg) boiler weight.
			46. Model: EB-NB-60-240, 240 V, 60 kW, 144.3 A, 4 elements at 15 Kw, 204,728 Btu/h, 5 to 21 gpm flow rate at 20 degrees F delta T, 680 lb (322 kg) boiler weight.
			47. Model: EB-NB-75-240, 240 V, 75 kW, 180.4 A, 5 elements at 15 Kw, 255,910 Btu/h, 5 to 26 gpm flow rate at 20 degrees F delta T, 685 lb (310 kg) boiler weight.
			48. Model: EB-NB-90-240, 240 V, 90 kW, 216.5 A, 6 elements at 15 kW, 307,092 Btu/h, 5 to 31 gpm flow rate at 20 degrees F delta T, 690 Ib (313 kg) boiler weight.
			49. Model: EB-NB-105-240, 240 V, 105 kW, 252.6 A, 7 elements at 15 Kw, 358,274 Btu/h, 5 to 36 gpm flow rate at 20 degrees F delta T, 695 lb (315 kg) boiler weight.
			50. Model: EB-NB-120-240, 240 V, 120 kW, 288.7 A, 8 elements at 15 kW, 409,457 Btu/h, 5 to 41 gpm flow rate at 20 degrees F delta T, 700 Ib (317 kg) boiler weight.
			51. Model: EB-NB-135-240, 240 V, 135 kW, 324.8 A, 9 elements at 15 kW, 460,639 Btu/h, 5 to 47 gpm flow rate at 20 degrees F delta T, 705 Ib (320 kg) boiler weight.
			52. Model: EB-NB-150-240, 240 V, 150 kW, 360.8 A, 10 elements at 15 Kw, 511,821 Btu/h, 5 to 52 gpm flow rate at 20 degrees F delta T, 710 lb (322 kg) boiler weight.
			53. Model: EB-NB-165-240, 240 V, 165 kW, 396.9 A, 11 elements at 15 kW, 563,003 Btu/h, 5 to 57 gpm flow rate at 20 degrees F delta T, 715 Ib (324 kg) boiler weight.
			54. Model: EB-NB-180-240, 240 V, 180 kW, 433.0 A, 12 elements at 15 Kw, 614,185 Btu/h, 5 to 61 gpm flow rate at 20 degrees F delta T, 720 lb (326 kg) boiler weight..

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* 1. BOILER ACCESSORIES

\*\* NOTE TO SPECIFIER \*\* This will simplify your wiring and make zoning applications much easier. In addition, enhanced communicating features have the ability to stage the electric boiler based upon the connected zone capacity. Delete if not required.

* + 1. Zone Control:
			1. Construction/Operation: Provide enhanced communicating features provide the ability to stage the electric boiler based upon the connected zone capacity.
				1. Utility load control.
				2. Terminal block wiring, visual wiring layout.
				3. Indicator lights showing zone operation.
				4. 24-volt, 40VA transformer 120/208/240 connection.
				5. Fuse protection.
				6. Priority option.
				7. Dual temperature operation.
				8. Applies to digital or standard thermostats.
				9. Dial switch, select each zone BTU capacity.

\*\* NOTE TO SPECIFIER \*\* Delete application not required. Pumps, Actuators, Valves.

* + - 1. Application: EB-ZTA-1 - install within boiler cabinet. Configured for zone pumps, zone valves (4-wire, 3-wire, 2-wire, or actuators) TACO self-contained pumps, etc. Eight documented configurations. Priority with dual temperature feature selections. Maximum of 4 zones.
			2. Application: EB-ZEA-1 - with enclosure and 40VA transformer. Same as ZTA for EB-Mx and EB-Cx Series larger boiler, has enclosure and a second 40 VA transformer. Maximum of 4 zones.
			3. Application: EB-ZEA-2 - add additional 4 zones, enclosure and 40 VA. Use with EB-ZTA-1 or EB-ZEA-1, extends all features to 8 zones, priority and dual heat still relate to zone 1.

\*\* NOTE TO SPECIFIER \*\* Delete application not required. Pumps.
\*\* NOTE TO SPECIFIER \*\* Delete application not required. Zone Valves.

* + - 1. Application: EB-ZTS-1 - install within boiler cabinet, encl. option. Zone valves only
			2. (4-wire, 3-wire, 2-wire, or actuators) priority with dual temperature feature. Maximum of 4 zones.
			3. Application: EB-ZES-1. Same as ZTS for EB-Mx and EB-Cx Series larger boiler, has enclosure and a second 40VA transformer. Maximum of 4 zones.
			4. Application: EB-ZTS-2 - add additional 4 zones, enclosure and 40 VA. Use with EB-ZTS-1, extends all features to 8 zones, priority and dual heat still relate to zone 1.

\*\* NOTE TO SPECIFIER \*\* Delete application not required. All Others.
\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Two Temperature Zone Controls:
			1. Handled as the priority zone on multi-zone (EB-ZEA-1).
			2. Priority switch on, zone 1 active - TS boiler automatically changes to supply water setting
			3. All other zones are held off.
			4. With zone 1 satisfied or 60-minute timeout, the boiler automatically returns to the preset temperature and reacts to the other zones.

\*\* NOTE TO SPECIFIER \*\* Radiant floor air stat in the same area as a forced air room stat presents serious control problems. A remote sensing slab stat for the radiant floor removes this issue. Remote sensing slab stat is required for storage applications. Delete if not required.

* + 1. Slab-Sensing Thermostats: Sensing and controlling the system based upon radiant floor surface temperature.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Circulating Pumps:
			1. Model 5585 - Mini-Boiler & 10 kW TS Series
				1. 120V, 1/25 HP, maintenance-free wet rotor circulator.
				2. Pump curve example - 5 GPM (19 L/M) at 11 ft. of head (32.9 kPa).
			2. Model 5586 - TS Series, Standard
				1. 120V, 1/6 HP, maintenance-free oil lubricated circulator.
				2. Pump curve example - 10 GPM (37.8 L/M) at 20 ft. of head (50.8 kPa).
			3. Isolation Pump Flange Valve:
				1. Two flanges, with isolation valve.
				2. Model 5578 - 3/4 inch (19 mm) Pipe.
				3. Model 5582 - 1 inch (25 mm) Pipe.
				4. Model 5579 - 1-1/4 inches (32 mm) Pipe.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Relays:

\*\* NOTE TO SPECIFIER \*\* Delete product not required.

* + - 1. Product: DPDT 24-volt switching relay. 24V coil. 120V, 10A, contact sets: Model EE-5053
			2. Product: Pump Switching Relay: Model- EE-5051.
			3. Product: Multi-Boiler Relay: Model EB-C-STG5.
			4. Product: Switchover to Standby, Total Run Time Relay: Model SOT-1.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Wiring Adapters:

\*\* NOTE TO SPECIFIER \*\* WarmFlo Controller - temperature sensing output and outdoor temperature sensing provide added comfort electric heat modulation and blower speed control for more uniform and comfortable heating. The WarmFlo controller was introduced in 1997 and is a proven and customer accepted technique for providing the maximum comfort and efficiency from your electric unit.

* + - 1. Product: Single Feed Bus for 2 CB's (SQ-D CB) Relay: Model 5701

\*\* NOTE TO SPECIFIER \*\* The WarmFlo Analyzer is a must have tool for all WarmFlo professionals. This diagnostic tool gives you complete control. Whether it's reprogramming chips, troubleshooting, overall system knowledge, or customizing to meet the customer's specific needs, you'll have the answer in the palm of your hand. The Analzyer has saved many contractors from multiple trips to the job site by allowing the service technician/installer the ability to reconfigure any WarmFlo system.

* + - 1. Product: Single Feed Bus for 3 CB's (SQ-D CB) Relay: Model 5702

\*\* NOTE TO SPECIFIER \*\* Electro Industries has had experience working with radiant heat. We have found that in order to achieve a balanced heat using radiant, a slab thermostat is critical. Electric boiler systems require a large mass with very slow response in order to allow electric utility control interruption for off-peak rates.

* + 1. Diagnostic Tools:
			1. Product: WarmFlo Analyzer, now applicable to all TS Series: Model WF-ANZ7.

\*\* NOTE TO SPECIFIER \*\* Our patented meter base generator transfer switch is the first of its kind. GenConnect is the first transfer switch that doesn't compromise safety in its effort to gain installation simplicity. With the simple meter base installation the GenConnect powers the complete panel - no naming individual circuits. The GenConnect is available in many different styles and amperages that can be suited for your specific needs.

1. EXECUTION
	1. EXAMINATION
		1. Do not begin installation until substrates have been properly prepared.
		2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Clean surfaces thoroughly prior to installation.
		2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
	3. INSTALLATION
		1. Install in accordance with manufacturer's instructions. Test for proper operation.
	4. PROTECTION
		1. Protect installed products until completion of project.
		2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION