



Keltech Electric Tankless Pre-Assembled Industrial Water Heater Skid, CNA-SKID Guide Specification

Bradley's Keltech Industrial Heater Skids are pre-piped, pre-assembled skid systems designed to accommodate most heavy industrial fluid heating applications where demand is 216kW - 288kW and flow rates from 3 to 120 GPM are required. CNA-SKID Series are designed for environments requiring precise temperatures up to 160 - 190 deg F (71 - 88 deg C) as an alternative to boilers. CNA-SKID units are suited to applications where 480V or 600V, 3-Phase, Delta-connected power is required.

The skid option includes skid and pre-piped heater assemblies with 2 inch (DN 50) shut-off ball valves, 2 inch (DN 50) inlet Y-strainer, and two 1 inch (DN 25) outlet pressure and temperature relief valves mounted to CNA and CNAR heaters. The skid is a 0.138 inch/10 ga. (3.5 mm) electro galvanized steel frame, powder coat painted Safety Yellow.

The Keltech PID Temperature Controller is more energy efficient and reliable than traditional microprocessors using staged elements. Power is infinitely variable, with no fixed inputs. The PID controller makes it possible to modulate the amount of power applied to the elements while also dispersing the required power evenly across all elements. This unique feature increases the product's life cycle. The liquid cooled solid state relays provide silent switching, which has a fast response and works in conjunction with the PID controller to infinitely modulate and add to the life of the heater.

Each heater features a heavy duty, low watt density, Incoloy® 800 sheathed resistive element. The Keltech design ensures greater protection, durability and resistance to scaling from hard water because water is only heated when flowing; this means sediment will not collect in the heat exchanger.

The heat exchanger features O-ring seals that outlast typical gasket construction. Common brass 2 inch (DN 50) female inlet and outlet connections with 1-1/4 inch NPT heater inlet and outlet connections. 2 inch (DN 50) Y-strainer included with inlet pipe assembly. NEMA 4X and explosion proof purge system options are available. Heater operating pressure range is 30 - 150 psig (207 - 1,035 kPa).

The CNA-SKID requires only one service feed per unit. Internal fusing is standard; internal fusing provides superior protection so the incoming circuit can be higher than 48 amps (NFPA 70). Keltech protects each heating element with fusing.

Enclosures: The skid-mounted cabinet enclosure is NEMA 4 rated and made from 0.075 inch/14 ga. (1.9 mm) mild steel and powder coated with ANSI 61 gray, corrosion resistant paint. The optional NEMA 4X enclosures are corrosion resistant for harsher environments and made from 0.060 inch/16 ga. (1.6 mm) 304 stainless steel. The NEMA 4X enclosure can also be specified with 316 stainless steel. Additional service access panel located on top of cabinet enclosure.

Independent Safeties: The internal thermostat with auto reset high limit switch ensures that when the temperature limit is reached, the unit will power down a bank of elements; when the temperature drops back down to the set point, power is restored. The surface mounted bi-metal thermostat acts as a fail-safe, and must be reset before power can be restored to the elements if the temperature limit is exceeded.

View Bradley's complete line of innovative Keltech tankless water heaters for ASME standard, continuous flow in industrial, healthcare, laboratory facilities, and specialty applications, at www.bradleycorp.com/tankless-water-heaters.

Contact Bradley Corporation, Menomonee Falls, WI 53051; Phone: 800-BRADLEY ((800) 272-3539).

Bradley eases the specifying process with a seasoned customer service staff and a range of helpful information tools on an advanced website. Bradley is the industry leader in the manufacture of premium quality commercial plumbing fixtures, valves, TMVs and washroom accessories that appear in the following CSI MasterFormat Sections:

Section 10 21 13 – TOILET COMPARTMENTS (Mills® Metal, Plastic-laminate, Phenolic, and Plastic units)

Section 10 28 13.13 – COMMERCIAL TOILET ACCESSORIES (Institutional and commercial accessories)

Section 10 28 13.14 – COMMERCIAL TOILET ACCESSORIES – Diplomat Series

Section 10 28 13.19 – HEALTHCARE TOILET ACCESSORIES (Patient care accessories)

Section 10 28 13.21 – WARM AIR DRYERS (Aerix® hand dryers)

Section 10 28 13.63 – DETENTION TOILET ACCESSORIES

Section 10 28 16 – BATH ACCESSORIES (Hospitality and commercial bath accessories)

Section 10 51 26 – PLASTIC LOCKERS (Lenox® Plastic Lockers)

Section 12 36 61 – SIMULATED STONE COUNTERTOPS (Terreon® and Terreon®RE countertops and integral sinks)

Section 22 11 19 – DOMESTIC WATER PIPING SPECIALTIES (Thermostatic mixing valves)

Section 22 33 13 – INSTANTANEOUS ELECTRIC DOMESTIC WATER HEATERS (Keltech tankless water heaters)

Section 22 42 16.01 – COMMERCIAL LAVATORIES AND FAUCETS (Express® and Frequency® Single and multi-station lavatories)

Section 22 42 16.02 – COMMERCIAL LAVATORIES AND FAUCETS (Advocate® lavatories)

Section 22 42 16.03 – COMMERCIAL LAVATORIES AND FAUCETS (Verge® lavatories)

Section 22 42 16.04 – COMMERCIAL LAVATORIES AND FAUCETS (OmniDecks™ lavatories)

Section 22 42 16.11 – COMMERCIAL SINKS AND FAUCETS

Section 22 42 23 – COMMERCIAL SHOWERS AND SHOWER VALVES

Section 22 42 33 – WASHFOUNTAINS (Sentry™, BradMate™, and Classic washfountains)

Section 22 43 00 – HEALTHCARE PLUMBING FIXTURES (Patient care lavatory units)

Section 22 46 00 – SECURITY PLUMBING FIXTURES

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SECTION 22 33 13 – INSTANTANEOUS ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Skid-mounted electric tankless industrial water heaters and water heater accessories.

Specifier: If retaining optional "Related Sections" article, edit to include sections applicable to Project.

1.2 RELATED SECTIONS

- A. Division 22 Section "Domestic Water Piping" for water piping.
- B. Division 22 Section "Domestic Water Piping Specialties" for vacuum breakers, water pressure-reducing valves, water-hammer arresters, and specialty valves.
- C. Division 26 Sections for electrical power and control wiring.

Specifier: If retaining optional "References" article, edit to include standards cited in edited Section.

1.3 REFERENCES

- A. General: Applicable edition of references cited in this Section is current edition published on date of issue of Project specifications, unless otherwise required by building code in force.
- B. American National Standards Institute (ANSI): www.ansi.org:
 - 1. ANSI Z21.22 - Relief Valves for Hot Water Supply Systems
- C. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE): www.ashrae.org:
 - 1. ASHRAE/IESNA 90.1 - Energy Standard For Buildings Except Low-Rise Residential Buildings
- D. American Society of Mechanical Engineers (ASME): www.asme.org
 - 1. ASME Boiler and Pressure Vessel Code, Section IV for "HLW" stamp and registered with National Board of Boilers and Pressure Vessel Inspectors for "NB" stamp
- E. American Society of Sanitary Engineering (ASSE): www.asse-plumbing.org
 - 1. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems
 - 2. ASSE 1010 - Performance Requirements for Water Hammer Arresters
- F. CSA Group (Canadian Standards Association) (CSA): www.csagroup.org/us/en/home:
 - 1. CSA C22.1 - Canadian Electrical Code
 - 2. CSA C22.21 - Construction and Test of Electric Storage-Tank Water Heaters

- G. National Electrical Manufacturers Association (NEMA): www.nema.org
 - 1. NEMA Standards Publication 250 - "Enclosures for Electrical Equipment (1000 Volts Maximum)"
- H. National Fire Protection Association (NFPA) www.nfpa.org
 - 1. NFPA 70 - National Electrical Code
 - 2. NFPA 496 - Standard For Purged and Pressurized Enclosures for Electrical Equipment
- I. NSF International (NSF): www.nsf.org
 - 1. NSF 61 - Drinking Water System Components – Health Effects
 - 2. NSF 372 - Drinking Water System Components - Lead Content
- J. Underwriters Laboratories (UL) www.ul.com
 - 1. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations
 - 2. UL 499 - Standard for Electric Heating Appliances

1.4 ACTION SUBMITTALS

- A. Product Data: For each product:
 - 1. Manufacturer's data sheets indicating unit performance and compliance with requirements.
 - 2. Include details of electrical and mechanical operating parts.
 - 3. Show mounting and securing requirements and utility connection requirements.

Specifier: Retain "LEED Submittals" Paragraph and corresponding "ASHRAE/IESNA Compliance" Paragraph under Quality Assurance Article below for LEED projects.

- B. LEED Submittals
 - 1. Product Data for Prerequisite EA 2 Minimum Energy Performance: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."
- C. Shop Drawings: Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATION SUBMITTALS

Specifier: Retain paragraph below when Project requirements include compliance with Federal Buy American provisions.

- A. Buy American Act Certification: Submit documentation certifying that products comply with provisions of the Buy American Act 41 U.S.C 10a – 10d.
- B. Source quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

Specifier: Retain "ASHRAE/IESNA Compliance" Paragraph for LEED projects and for other projects where compliance is required by authorities having jurisdiction.

- A. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
- B. Source Limitations: Obtain electric tankless water heaters through a single source from a single manufacturer.
- C. Electrical Components: Listed and labeled per NFPA 70, Article 100, by a testing agency acceptable to authority having jurisdiction.

Specifier: Retain "Boiler and Pressure Vessel Safety Requirements" paragraph option based on project requirements:

HLW: When the heater has a heat input of 200,000 Btuh (58.6 kW) or more, or an output temperature of 210 deg F (99 deg C), or when authority having jurisdiction requires that water heater manufacturer complies with manufacture, inspection, and testing requirements in accordance with ASME Boiler and Pressure Vessel Code, Section IV.

- D. Boiler and Pressure Vessel Safety Requirements: Comply with ASME "Boiler and Pressure Vessel Code," [Section IV for "HLW"] stamp.
- E. Unit Construction: Comply with CSA C22.2 No. 88 for heater unit construction.
- F. Sanitation Standard: Comply with NSF 61 for fixture components in contact with potable water.
- G. Lead-Free Construction: Comply with NSF 372 for fixture components in contact with potable water.

1.8 WARRANTY

- A. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

- 1. Warranty Periods: From date of placing into service.

Specifier: Select warranty period options in the following paragraphs based on whether the specified units are constructed to ASME Code standards.

- a. Electrical Components: Two years.
- b. Heating Elements: Four years.
- c. Heating Elements, ASME: Five years.
- d. Heat Exchanger: Eight years.
- e. Heat Exchanger, ASME: Ten years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to requirements, provide Keltech electric tankless large industrial water heaters by Bradley Corporation, Menomonee Falls, WI 53051, (800) 272-3539; Email info@BradleyCorp.com; Website www.bradleycorp.com.

2.2 SKID-MOUNTED ELECTRIC TANKLESS LARGE INDUSTRIAL WATER HEATERS

Specifier: **Keltech CNA-SKID Series** water heaters include automatic reset and manual reset controls to disable the water heater if the water temperature increases to 175 deg F (79.5 deg C).

- A. Electric tankless large industrial process water heater system, UL 499, sized for stable, temperature duty to meet flow requirements and temperature setpoints up to 160 deg F (71 deg C)- compliant fixtures, with liquid-cooled solid-state relays, flow activation, external emergency stop button, and anti-scald protection.

1. Basis of Design Manufacturer/Model: **Bradley Corporation, Keltech CNA-SKID Preassembled Industrial Heater Skid.**

Specifier: Retain NFPA 496 option in the following paragraph only when explosion proof option EXP2CFPM is required.

2. Enclosure: [NFPA 496,] UL 50E, [0.75-inch/14-ga.- (1.9-mm-) thick galvanized steel, NEMA 4] [0.64-inch/16-ga. (1.63-mm-) thick [304] [316] stainless steel, NEMA 4X].
- a. Freeze Protection: [Not required] [to -20 deg F (-29 deg C)] [to -30 deg F (-35 deg C)].
- 1) Provide internally insulated [NEMA 4] [NEMA 4X] enclosure with thermostatically controlled forced air heater.
 - 2) Power freeze protection from main skid power source. Freeze protection requiring separate power circuit is not acceptable.
 - 3) Provide connection terminals for Distributed Control System (DCS) monitoring loss of freeze protection due to power failure.
- b. Explosion-Proof Class 1, Division 2: [Required] [Not required].
- c. Mounting: Skid-mounted, free standing.
- d. Skid Construction: Fabricate skid of 0.1382 inch/10 ga. (3.5 mm) electro galvanized steel frame. Powder coat skid "Safety Yellow."

Specifier: Retain option for certification in "Heat Exchanger" Paragraph below when required. Keltech CNA-SKID units are the only electric tankless water heaters available with ASME and National Board certifications with the NB and HLW stamp. Available for 200,000 Btuh (58 kW) and higher units.

3. Heat Exchanger: Copper tubing with brazed brass fittings and other NSF 61 barrier materials for potable water, without storage capacity [ASME- and National Board-certified]. Provide materials that are lead-free, and comply with NSF 372.

Specifier: Retain lining and coating options below as required for deionized water or corrosive liquid processing requirements.

- a. PFA-Teflon-lining and FDA-approved.
 - b. Xylan Fluoropolymeric coated and FDA- approved.
4. Connections: 1-1/4 inch NPT inlet and outlet.
 5. Pressure Rating: 150 psig (1,035 kPa).
 6. Heating Element: Incoloy[®] 800 sheathed low-watt density resistance heating system.

Specifier: Retain the following paragraph to select standard, on-skid controls; delete if retaining following requirement for BMS controls.

7. Temperature Control: Microprocessor based thermostat with PID controller and dual display of set-point and actual outlet water temperature.

Specifier: Retain the following paragraph to select remote control by the Building Management System (BMS). Delete the previous paragraph for temperature control.

8. Building Management System (BMS) Temperature Control: Provide components required to allow remote control by BMS, via 4 - 20 mA dc analog signal.
9. Safety Controls:
 - a. 175 deg F (79.5 deg C) high-temperature-limit alarm/cutoff with automatic reset.
 - b. 175 deg F (79.5 deg C) high temperature cutout with manual reset.
 - c. Door cutoff switch and emergency stop button.
 - d. Internal Fused Disconnect: [Required] [Not required].
 - 1) Provide fused disconnect that interlocks with enclosure door, to prevent opening enclosure while unit is energized.

Specifier: When required, retain the following paragraph describing optional ground fault protection.

- e. Ground Fault Protection: Provide ground fault system that senses leakage current to ground greater than 1 A. In event fault is detected, provide ground fault protection to deenergize high voltage power supply to heating elements and disable unit operation. Communicate ground fault status externally at control interface. Provide ground fault test and reset buttons on outside of cabinet door.
10. Configuration: Back to back heater units mounted on skid. Provide one standard and one reverse configuration heater with piping connections on same side of skid.
 11. Capacity:

Specifier: If temperature rise/flow rate data appear on Drawings, then select "As scheduled" option in two subparagraphs below. Otherwise, insert temperature rise and flow rate below from product data sheet. Temperature rise range available: 10 – 140 deg F (6 – 78 deg C). Flow range available: 5 - 120 gpm (18.9 - 454 L/m) for back to back units.

- a. Temperature Rise at Flow Rate: [___ deg F (___ deg C) at ___ gpm (___ L/m)] [As scheduled].

- b. Adjustable Temperature Setpoint: [___ deg F (___ deg C)] [As scheduled].

Specifier: Select 108, 126, or 144 kW for each heater in the following paragraph.

12. Electrical Characteristics: [108] [126] [144] kW at [480VAC/3-phase/3-wire] [600VAC/3-phase/3-wire] [As scheduled].

2.3 WATER HEATER ACCESSORIES

Specifier: Retain optional accessories as required for project from those in paragraphs below; delete items not needed. Coordinate with contents of other Division 22 sections.

- A. Pressure and Temperature Relief Valves: [Stainless steel] ASME rated and stamped. Include pressure setting less than water heater working-pressure rating.

Specifier: 150 psig is the standard relief valve setting. Fill in optional values in the following paragraph, when required.

- a. Pressure and Temperature Safety Relief Valve set to 150 [___] psig (1,034 [_____] kPa).

- B. Pressure-Reducing Valves: ASSE 1003.
C. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
D. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
E. Thread Adapters: NPT to BSPP, stainless steel.
F. Y-Strainer: Stainless steel.

2.4 SOURCE QUALITY CONTROL

Specifier: Retain and edit following paragraph if ASME label is required.

- A. Factory Tests: Test and inspect domestic-water heaters according to ASME "Boiler and Pressure Vessel Code," Section IV. Submit test reports.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Electric, Tankless, Domestic-Water Heater Mounting:
1. Install water heater skid in accordance with manufacturer's written instructions.
 2. Install water heater skid level and plumb, according to layout drawings and referenced standards. Anchor to structure as recommended by manufacturer.

Specifier: Retain subparagraph below for applications where seismic design of component fastening to structure is required by authorities having jurisdiction. Consult project structural engineer for performance requirements.

- a. Anchor to structure in accordance with Project seismic design requirements.
3. Maintain manufacturer's recommended clearance and access dimensions.
- B. Install water supply piping to each water heater, and from heater to fixture requiring hot water supply connection.
 1. Install shutoff valves on water supply and outlet piping. Provide stop valve on each supply in readily-serviced location. Lock stop valve in OPEN position.
- C. If shipped loose, install pressure and temperature safety relief valves on water heater. Manifold relief valve discharge as shown in manufacturer's written instructions.

Specifier: Select one of the two following paragraphs, as required by project conditions.

- D. Extend relief-valve outlet line, and discharge by positive air gap above closest floor drain.
- E. Install relief valve drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping.
- F. Run relief valve drain piping without creating tripping hazard.

Specifier: Retain accessories in following paragraph that are required for project; coordinate with contents of other Division 22 sections.

- G. Install [pressure-reducing valve with integral bypass relief valve in water heater cold water inlet piping] [and] [water hammer arrester in water-heater outlet piping], maximum outlet pressure [____ psig (____ kPa)] [as scheduled].

3.2 FIELD QUALITY CONTROL

- A. Do not energize water heater until hydrostatic testing of domestic water lines is complete. See Division 22 Section "Domestic Water Piping."
- B. Test and adjust installation.
 1. Set field-adjustable temperature set point of temperature-actuated controls. Adjust set point within allowable temperature range.
 2. Replace defective or malfunctioning controls and equipment.
- C. Clean unit surfaces, test fixtures, and leave in ready-to-use condition.

END OF SECTION