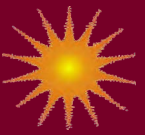


ROUGH-IN PROCEDURES



The following guidelines will help insure a proper installation:

- a. Cold Leads are conductors that connect the secondary of the Transformer to the ZMesh or Tuff Cable Heating Elements.
- b. Cold Lead runs should be planned from the Tuff Cable or ZMesh heating element connection points to the Back Plate. Leave approximately 14 inches of Cold Lead protruding through the Back Plate, and 10 inches of extra Cold Lead wherever the connection between the Cold Lead and heating element will be made.
- c. Do not kink the Cold Leads.
- d. To minimize the size of the flux lines or lines of force of any magnetic field given off by the Cold Leads, always run Cold Leads in pairs and have those pairs as close to one another as possible. In order to minimize the potential for problems caused by any magnetic field given off by the Cold Leads, always avoid running Cold Leads in areas over, under, behind, or otherwise near the place where televisions and or computer monitors using Cathode Ray Tube technology will be located. Keep Cold Lead off of and out of metal ducts.
- e. Place the pair of Cold Leads on the same stud, or put both Cold Leads in the same conduit. Never run individual Cold Leads in conduit.
- f. Magnetic and non-magnetic metal studs require special consideration. Refer to a current edition of NEC or CSA for installation considerations.
- g. The Cold Lead length and element length affect the Watts per square foot your system will deliver to the area where the Tuff Cable or ZMesh heating element is installed. If you have a question or concern, or if you are considering adding to the Cold Lead or heating element provided to you by Heatizon, contact Heatizon Systems or your Heatizon Distributor for more information.
- h. Each Cold Lead is equivalent to #2AWG THHN copper conductor. As a result, grouping, banding or bundling of Cold Leads must be in accordance with NEC or CSA. Follow guidelines found in the NEC or CSA for Cold Lead spacing outside of conduit and allowable number of conductors permitted to be installed in conduit.
- i. Refer to the NEC or CSA when installing Cold Leads in insulation. Note that Heatizon Systems recommends that its low voltage products operate at 96 or less secondary Amps.

CBX6/CBX23 and CBX7 Control Unit Steps



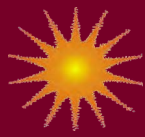
- Determine the location and install the Back Plate
- Plan and install the Cold Lead
- Install the Thermostat Wire
- Run the appropriate electrical service
- Plan Jumpers if needed

RADIANT 8 Control Unit Steps



- Determine the location and install the Back Plate
- Plan and install the Temperature Compensation Thermistor*
- Plan and Install the Cold Lead
- Install the Thermostat Wire
- Run the appropriate electrical service
- Plan Jumpers if needed

* Please make note of this additional step for the Radiant 8



Determine the Location of the Back Plate

1.1 Determining the placement location of the Back Plate is the first step in the electrical rough-in process. The placement of this plate must allow for easy future access, good air flow, and protection from moisture. Acceptable locations include garages, basements, utility rooms, or mechanical rooms.

Use the following guidelines for locating the Back Plate:

Location must be easily accessible for installation, service and maintenance.

Maintain a minimum of 6 inches of clearance between the Back Plate and any ceiling, wall, floor or adjacent Back Plate.

Do not locate Back Plate in an area where it will be covered.

Maintain 45 inches of clear space in front of every Back Plate.

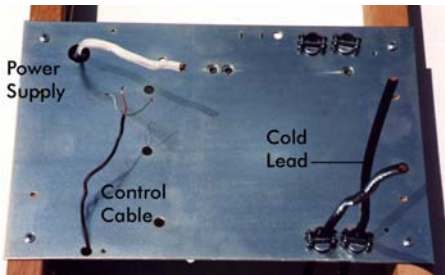
Placement outdoors is acceptable only if enclosed in a Heatizon Systems Enclosure Kit (ENCLKIT), which comes with a customized Back Plate.

Do not place in an area where high humidity is present, or where Control Unit may be exposed to water.

Consideration for sound and vibration of transformer is advised. Proper sound attenuation insulation or vibration isolation is recommended.

Note: Knockout opening in all Heatizon Systems products should never be used except with devices that are designed to fill those openings.

Note: When installing Heatizon Systems products, strict compliance with the National Electrical Code (NEC), Canadian Electric Code (CEC), local Building Codes, and Heatizon Systems Design and Installation Manual is essential.



Back Plate (P1320)



Rough-In Box (P4184)



Enclosure Kit (ENCLKIT)

1.2 Determine whether the Back Plate (P1320) will be installed on studs (spaced on 16" centers), on a concrete or other non framed surface using a Rough-In Box (P4184), or if an Enclosure Kit will be used.

- **Back Plate on studs.** If Back Plate will be mounted on studs, studs must be capable of supporting shear and lateral loads of at least 100 pounds per Back Plate. Press the provided black bushings through the five (5) appropriately sized holes in the Back Plate. The bushing for the power conductor in the upper left hand side of the Back Plate must be pressed in from the back so that it will not interfere with the installation of the Control Unit. The other four (4) black bushings or those for the two upper and two lower holes on the right-hand of the Back Plate may be pressed in from the front of the Back Plate.

- **Back Plate on concrete.** If the Back Plate mounting area is to be a concrete or non-framed surface, the use of a Heatizon Rough-In Box (P4184) is recommended, and should be installed at this point. The Rough-In Box provides several knock-outs for ease of conduit connections and 1/4-20 bolted connections of the Back Plate to the Rough-In Box. The Rough-In Box is to be surface mounted using adequate anchoring devices to accept shear loads and lateral loading of Control Unit and Transformer (weight may equal 100 lbs for larger systems).

- **Enclosure Kit.** If the Back Plate will be exposed to water or high humidity, or if it will be mounted outdoors, a Heatizon Systems Enclosure Kit with a customized Back Plate should be used.

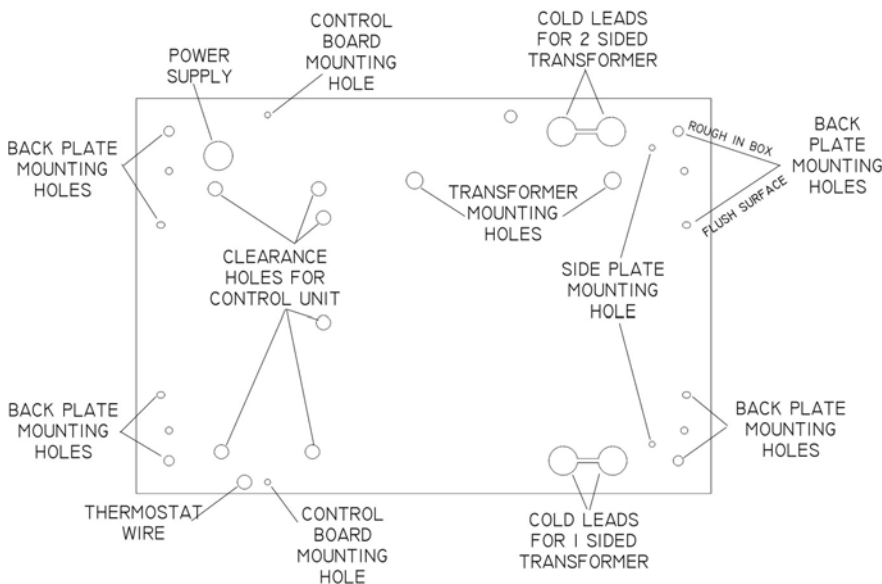
Install the Back Plate

1.3 Install the Back Plate on studs or on a Rough-in Box.

Back Plate on studs. Press black bushings through the five designated holes in the Back Plate. These holes will later be used for the Cold Leads and power supply.

You may wish to pre-drill holes before inserting anchoring devices. Use anchoring devices which are capable of supporting shear and lateral loads of up to 100 pounds.

After securing an anchoring device in one mounting hole, level the Back Plate before inserting remaining screws.



Back Plate in a Rough-In Box. If the Back Plate mounting area is to be a concrete or non-framed surface, a Heatizon Rough-In Box (P4184) was installed in Step 1.2.

Using the bolts provided, the Back Plate will be installed to the Rough-In Box (P4184) using the same steps above, after the wires have been run.



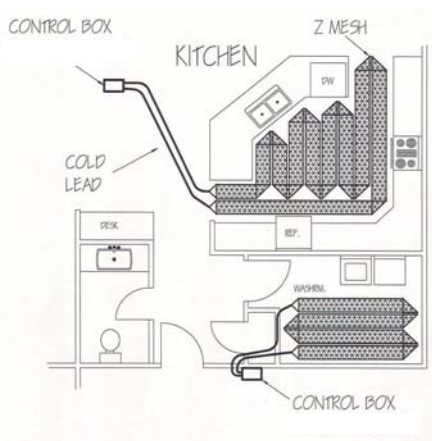
Plan the Cold Lead

1.4 The Cold Leads will be run the total horizontal and vertical distance from the selected Back Plate or Rough-In Box placement location, to the location where the Tuff Cable or ZMesh will eventually begin and end. Once the Back Plate(s) has been installed, plan the Cold Lead runs by walking through the building.

Generally there are three possible configurations for running the Cold Lead. Make sure you know the type of system you have purchased and how to layout your design before you begin.

Sample Layout 1

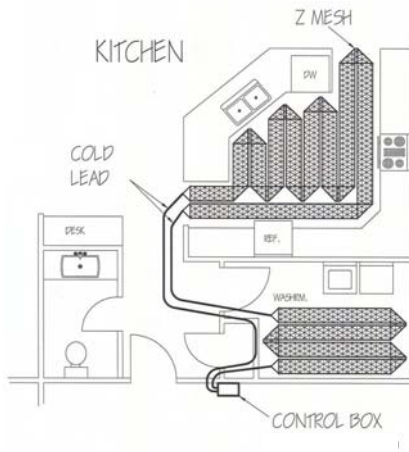
Each full sized heated area is connected to one standard Control Unit. Each heated zone is connected to its own Control Unit.



ZMesh and Cold Lead Sample Layout for two separate zones connected to two separate Control Units.

Sample Layout 2

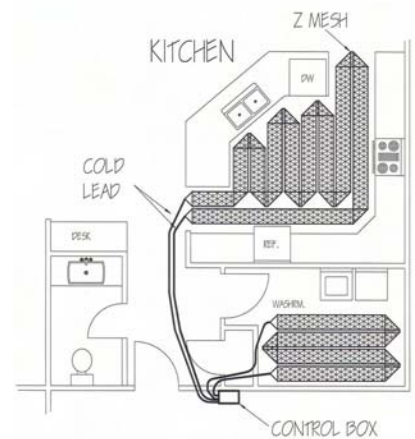
Two smaller heated areas are jumpered together and connected to one standard Control Unit.



ZMesh and Cold Lead Sample Layout for two separate areas connected in series by "jumpering" the areas together with Cold Lead.

Sample Layout 3

Two full sized heated areas are connected to one double Control Unit (CBX23) as two separate closed loop systems.



ZMesh and Cold Lead Sample Layout for two separate loops connected to a 2X2 or 2X3 kVA Transformer. Note that two pair of Cold Leads are required for this configuration.

Note: CBX6, CBX7 and Radiant 8 systems with single secondary tap transformers require one pair of Cold Leads for the beginning and ending points of the Tuff Cable or ZMesh heating element.

Note: All connections between Cold Leads and Tuff Cable must be imbedded in mortar, asphalt, concrete, a Heatizon Heatsink Kit, Invizimelt Kit or other acceptable heat sink material.



IMPORTANT! A red plastic "STOP! DANGER!" sign indicating the presence of electric deicing, snow melting, or warming equipment has been included with your Heatizon product packaging. This caution notice must be posted at the fuse or circuit breaker panel and be clearly labeled.

Note: CBX23 and Radiant 8 with 2X2 or 2X3 kVA Transformer systems require two pair of Cold Leads, one pair for the beginning and ending points of the first length of heating element, and the other pair for the beginning and ending points of the second length of heating element (see illustration above). Each length of heating element must be approximately the same length. Refer to 2X2kVA or 2X3kVA System Operating Table in Section 8 of this manual for minimum and maximum lengths.

For Radiant 8 Control Unit Installation Only—Important! Radiant 8 System will not operate without this component.

Temperature Compensation Thermistor

The resistance of Tuff Cable and ZMesh Heating Elements will change as their temperature changes. The Temperature Compensation Thermistor is designed to compensate for changes in the temperature of the Tuff Cable or ZMesh Heating Element and adjust the Over Current and Under Current Faults as necessary. This Thermistor is used to sense the Heating Element or load temperature, and communicate that temperature to the Radiant 8 Control Unit. The Radiant 8 Control Unit utilizes the communicated temperature to calculate the appropriate range of Over and Under Current and then to compensate the Over and Under Fault Circuits for temperature.

Instructions:

The Radiant 8 requires a Thermistor to be placed at the load or heating element. Run the Thermistor cable with one of the Cold Leads so that it extends from the Radiant 8 to the Tuff Cable or ZMesh Heating Element. Place the sensor end of the Thermistor evenly between two runs of Heating Element about two feet in from the transition between the Cold Lead and Tuff Cable or ZMesh. Connect the Thermistor cable to TB3, (Thermistor 2), terminal block, on the **Display Board** of the Radiant 8 Control Unit. (Refer to page 4-13 for Display Board diagram)

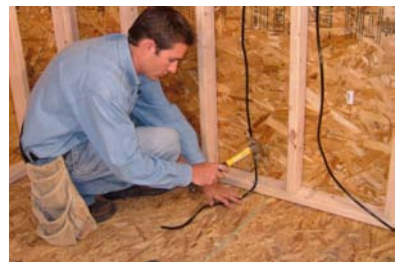
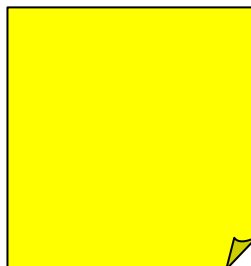
Warning: Always consult the NEC or CEC for grouping, banding and routing of the Cold Leads

1.5 Run Cold Leads the total horizontal and vertical distance from the selected Back Plate or Rough-In Box placement location, to the location where the heating element will eventually begin and end. Pull the wire through holes drilled in the studs or through conduit, and secure both ends of the Cold Lead.

Install the Cold Lead through the back of the Back Plate, leaving approximately 14 inches protruding through the front of the Back Plate, and approximately 10 inches where the Cold Lead will connect to the heating element. If Cold Leads are shortened, the required markings must be retained.

Note: All Heatizon Systems Transformers require one pair of Cold Leads (except for S202 -- 2X2kVA and S203--2X3kVA Transformers which require two sets of Cold Lead pairs). One of the Cold Leads from any given pair connect to the common tap located at the back of the Transformer and the other Cold Lead connects to one of the voltage taps at the front of the Transformer.

IMPORTANT!
Record the number of feet of Cold Lead that you have installed for each system here:



CBX6,CBX7 OR RADIANT 8 SYSTEM

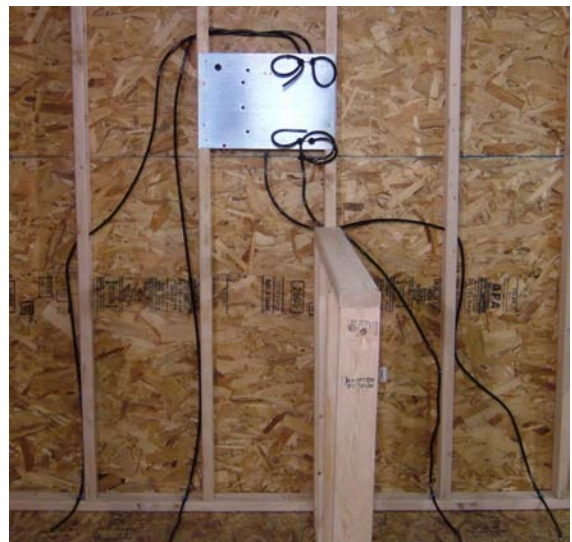
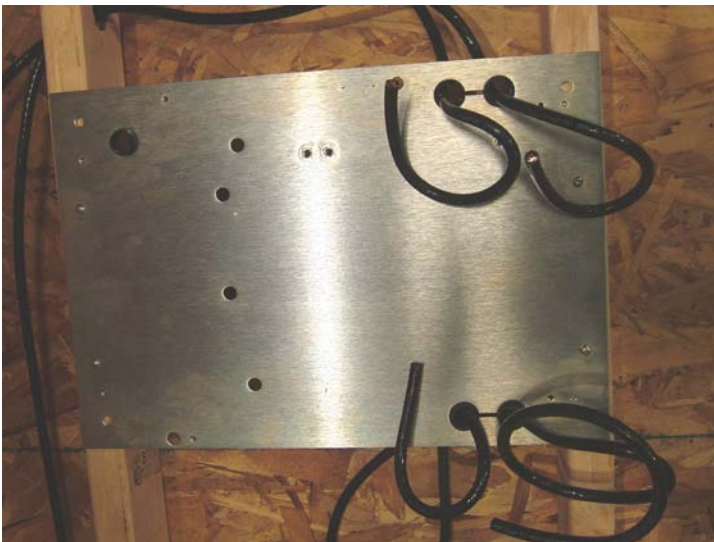
(SINGLE SECONDARY TAP TRANSFORMER)



Remember, CBX6, CBX7 and Radaint 8 systems require one pair of Cold Leads for the beginning and ending points of heating element.

CBX23 OR RADIANT 8 SYSTEM

(DOUBLE SECONDARY TAP TRANSFORMER)



CBX23 or Radiant 8 Systems (using 2x2 and 2x3 kVA Transformers) require two pair of Cold Leads, one pair for the beginning and ending points of the first length of heating element, and the other pair for the beginning and ending points of the second length of heating element (see illustration above). Each length of heating element must be approximately the same length. Refer to 2X2kVA or 2X3kVA System Operating Table in Section 8 for minimum and maximum lengths.

COLD LEAD TO ELEMENT CONNECTIONS—

Eventually, you'll make connection from the Cold Leads to your chosen heating element. Make sure the Cold Lead has been properly installed to insure it can be connected to the ZMesh or Tuff Cable element later in the install process. See Section 7, "Making the Connection," for specific connection instructions.

ROUGH-IN THROUGH SUB-FLOOR OR SUB-ROOF—FLOOR HEATING OR ROOF MELTING: When installing transition plates in floor heating installations and roof snow melting installations, extend Cold Lead up through sub-floor or sub-roof, leaving 10", and anchor in place. Cold Leads should be spaced to accommodate the specific heating element to be used:

- 12" ZMesh = 14" apart
- 9" ZMesh = 11" apart
- Tuff Cable = 6" apart

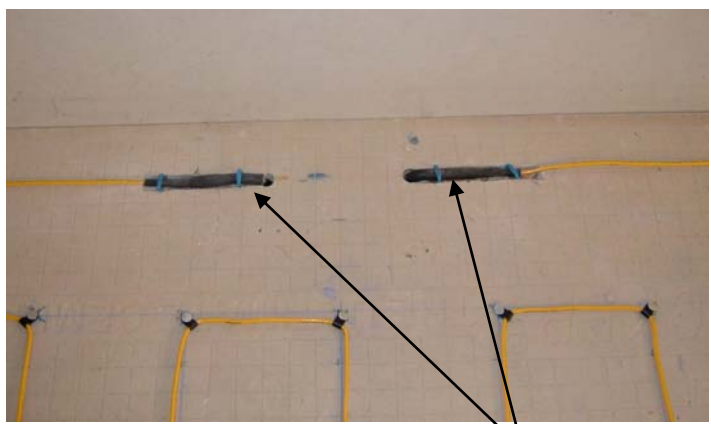


ROUGH-IN THROUGH WALL—FLOOR HEATING OR ROOF MELTING: For wall installations of Transition Plates, anchor Cold Lead to sill plate and extend beyond face of finished material 10". Cold Leads should be placed such that Transition Plates will never touch one another, and the tips of the Transition Plates should not be closer than 2" apart at the nearest point. Cold Leads should be spaced to accommodate the specific heating element to be used:

- 12" ZMesh = 14" apart
- 9" ZMesh = 11" apart
- Tuff Cable = 6" apart

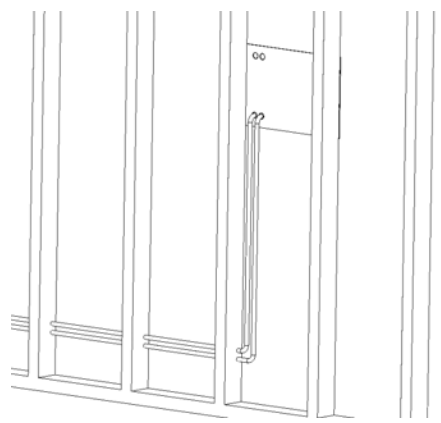


ROUGH IN FOR TUFF CABLE SYSTEMS—SNOW MELTING OR INTERIOR SPACE HEATING: When installing Cold Lead in Tuff Cable heating or snow melt systems, Cold Leads should be placed such that connection points of E210BS Butt Splices are a minimum of 4" apart. Extend Cold Lead by 10" and secure Cold Lead in place.



Note: All connections between Cold Leads and Tuff Cable must be imbedded in a mortar, asphalt, concrete, Heatizon Heatsink Kit, Invizimelt Kit or other acceptable cementitious heatsink material.

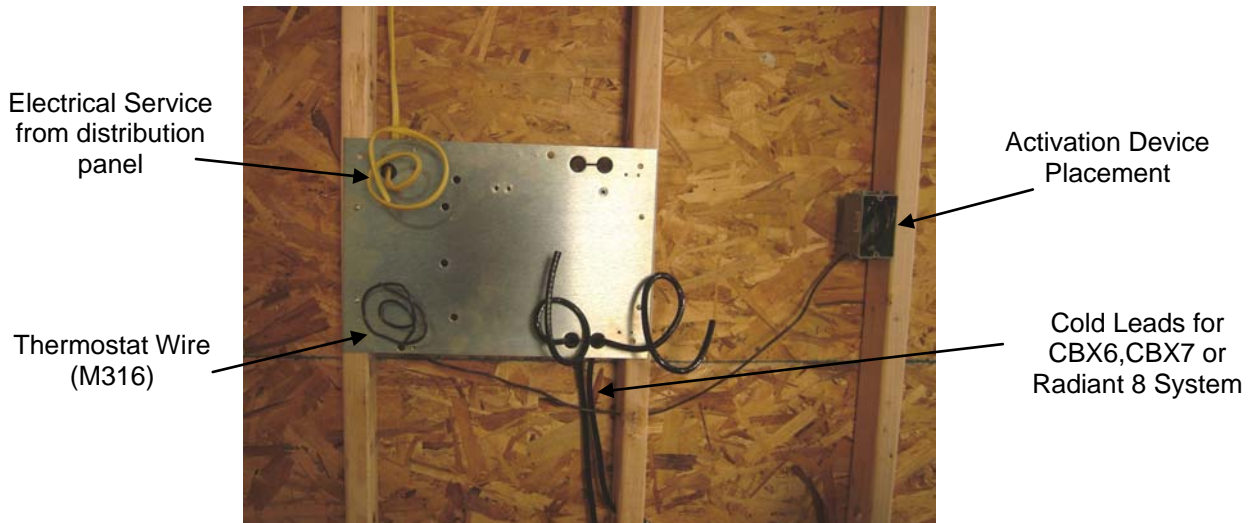
Cold Lead Rough-In in standard wood frame wall. Local building codes may require conduit.



Install the Thermostat Wire

1.6 Before you begin, read the specific wiring instructions and installation instructions provided for the activator selected. See the “Activation Devices” section of this manual and the instructions included in the activation device packaging for further details.

- a. Run the Thermostat Wire (M316) the total horizontal and vertical distance from the Back Plate placement location to the location selected for the Activation Device.
- b. Determine and provide the appropriate power if needed to the chosen Activation Device.
- c. Install sensors, if any, at this point, such as remote bulb sensors, floor sensors, or temperature moisture sensors.



Install the Electrical Service Requirements for the Control Unit

1.7 Run the appropriate line voltage conductors the total horizontal and vertical distance from the distribution panel to the Back Plate or Rough-in Box in accordance with the NEC. All Heatizon Systems products require a dedicated circuit. Never exceed the maximum rating of the Transformer. Do not exceed 25 Primary Amp Draw.

	S050 1/2 kVA	S101 1 kVA	S102 2 kVA	S103 3 kVA	S104 4 kVA	S105 5 kVA	S106 6 kVA	S202 2 x 2 kVA	S203 2 x 3 kVA
120 VAC Input	Single pole 15 amp breaker and appropriate sized conductors	Single pole 15 amp breaker and appropriate sized conductors							
208 VAC Input			Double pole 20 amp breaker and appropriate sized conductors	Double pole 20 amp breaker and appropriate sized conductors	Double pole 30 amp breaker and appropriate sized conductors	Double pole 30 amp breaker and appropriate sized conductors	Double pole 30 - 40 amp breaker and appropriate sized conductors	Double pole 30 amp breaker and appropriate sized conductors	Double pole 30 - 40 amp breaker and appropriate sized conductors
240 VAC Input			Double pole 20 amp breaker and appropriate sized conductors	Double pole 20 amp breaker and appropriate sized conductors	Double pole 30 amp breaker and appropriate sized conductors	Double pole 30 amp breaker and appropriate sized conductors	Double pole 30 - 40 amp breaker and appropriate sized conductors	Double pole 30 amp breaker and appropriate sized conductors	Double pole 30 - 40 amp breaker and appropriate sized conductors
277 VAC Input					Single pole 30 amp breaker and appropriate sized conductors	Single pole 30 amp breaker and appropriate sized conductors	Single pole 30 - 40 amp breaker and appropriate sized conductors	Single pole 30 amp breaker and appropriate sized conductors	Single pole 30 - 40 amp breaker and appropriate sized conductors

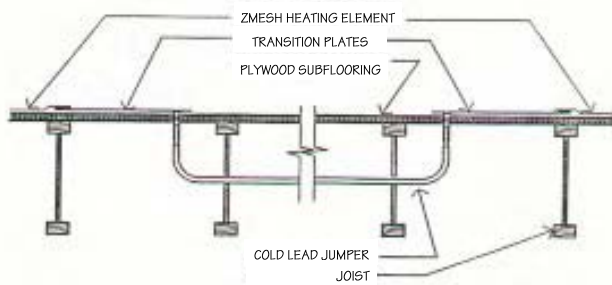
Note: Unlike the CBX6 and CBX23 Control Units, the CBX7 and Radiant 8 do not come with a built in switch for the primary power. A physical disconnect for the CBX7 and Radiant 8 may be required by local building inspectors.

Jumpering

1.8 At this point, it is necessary to plan out any jumpers that may need to be installed. A jumper is necessary **whenever two adjacent detached areas are connected to one another**, or whenever heating element will pass through any joint. Never install Cold Lead, Tuff Cable or ZMesh element where they bridge or extend through any joint, or mark, unless provision is made for expansion and contraction with a jumper. See Section 7, "Making the Connection," for specific connection instructions.

a. Area to Area Jumper.

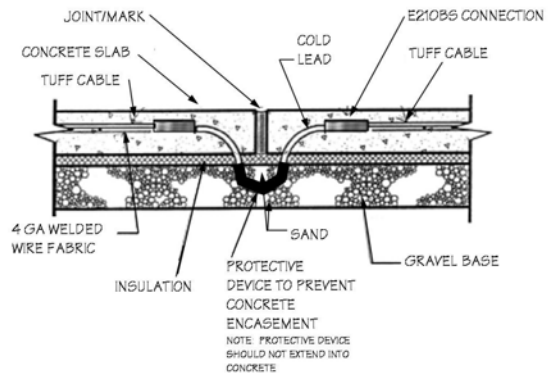
It is not necessary that all heated areas be adjacent to one another. Jumpering between different areas can be accomplished by using an adequate amount of Cold Lead (E210) and two Transition Plates (E217) for ZMesh systems, or two Butt Splices (E210BS) for Tuff Cable systems.



ZMesh heating element can be jumpered by using an adequate length of Cold Lead and two E217 Transition Plates. All jumpering of element is to be done using Heatizon Cold Lead (E210) only.

b. Joint/Mark Jumper.

Always jumper through every kind of joint/mark in all types of mortar, asphalt, mud bed, concrete, sand, or any other heatsink except Heatizon Heatsink Kit (CABSINKKIT) or Invizimelt (JUMPERKIT).



Tuff Cable heating element can be jumpered by using a Heatizon Jumper Kit. All jumpering of element is to be done using Heatizon Cold Lead (E210) only. All Butt Splices (E210BS) must be imbedded in a heat sink.

Note: Remember that all Tuff Cable or ZMesh heating element to be energized by a single Transformer (S050, S101, S102, S103, S104, S105 or S106) or to be energized by each side of a double Transformer (S202 or S203) must be a continuous loop connected in series.

Note: Always determine the total length of Cold Lead and heating element attached to each Control Unit and Transformer, and make certain that the watts per square foot generated will meet your needs. See Section 8 of this manual, *System Operating Tables* and *Useful Information*, for additional information.

CAUTION: THIS IS AN ENTIRE COPPER SYSTEM. UNDER NO CIRCUMSTANCES ARE COMPONENTS MADE OF OTHER METALS SUCH AS ALUMINUM TO BE SUBSTITUTED FOR HEATIZON SYSTEM COMPONENTS. THE ADDITION OF ANY NON-HEATIZON SYSTEMS COMPONENT OR MATERIAL TO ANY HEATIZON SYSTEMS PRODUCT WILL VOID THE WARRANTY.

Congratulations!
You are now ready to install heating element!

