



# EASYHEAT®



## Installation Instructions

SUPPLEMENTARY SUB-FLOOR ELECTRIC HEAT-STORAGE SYSTEM  
CABLES & MATS

### READ CAREFULLY BEFORE BEGINNING INSTALLATION

THESE INSTRUCTIONS WILL ENSURE A SAFE AND RELIABLE THERMAL ENERGY STORAGE SYSTEM IF CAREFULLY FOLLOWED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN UNSAFE OR UNRELIABLE INSTALLATIONS. IF YOU REQUIRE ADDITIONAL ASSISTANCE, PLEASE CONTACT EASY HEAT FOR PROFESSIONAL ADVICE AT 800/537-4732.

## 1.0 General

Heat Bank® heating cables are designed to heat moist sand beds under concrete floors. The heat from the sand bed heats the concrete floor which, in turn, radiantly heats people and objects in the space above the floor. The sand bed will usually take several hours to heat up ("charge") and, correspondingly, will continue to provide heat to the floor after the cable power has been turned off. This enables the sand to be charged during periods when electrical energy is less expensive ("off peak"), usually at night, and discharged during periods of higher energy cost, usually during the day. Due to the slow response time of the Heat Bank system to changes in temperature, and due to the fact that the Heat Bank system is buried beneath the concrete floor and cannot be accessed for service or replacement, a separate building heat source that can be serviced and replaced as required must be installed when the building is being constructed.

It is important to undertake a detailed heat loss of the planned building. Heat Bank cables/mats will provide adequate heating capacity for heat losses up to about 12 W/sq.ft. Buildings with heat loss in excess of 12 W/sq. ft. may also require supplementary "quick recovery" type heating, although Heat Bank cables/mats equal to the total heat loss should be installed. The major heat loss sources of such buildings should also be reviewed to determine if these sources can be modified to reduce heat loss. Contact Easy Heat for further information.

Heat Bank heating cables are available as cable provided on a spool or in pre-configured mats. Mats are typically laid onto a sand bed (minimum 2" thick) and then covered with a sand layer (minimum 2" thick). Spooled cables are typically plowed into the center of a sand bed (minimum 4" thick).

Each heating zone will require two (different) thermostats: an adjustable sensing thermostat to control floor temperature at an appropriate setting, and a pre-set thermostat to ensure heating cable temperature does not exceed design requirements.

Insulation of perimeter foundation walls is required. Though optional, insulation under the cable sand bed improves system performance.

It is important to ensure that the sand bed remains moist, as this greatly enhances the amount of heat the bed can store and promotes heat transfer away from the heating cables. The installation of a 6-mil polyethylene vapor barrier above the sand bed will help to retain moisture in the bed.

It is recommended the heating system be designed to use several smaller wattage cables rather than one large wattage cable. A scaled drawing must be made showing the heating cable layout, related branch circuitry, junction boxes and controls. Retain this drawing for future reference, as warranty is void without this drawing.

## 2.0 Planning

For maximum efficiency it is recommended that Heat Bank cables utilize a tightly compacted, moist sand base of at least 4" depth, although, typically, sand beds are 10 to 12" deep. Sand bed depths of up to 18" are possible; sand bed depth is determined by the building design and geographic region. Use only washed masonry mortar sand (or any sand complying with ASTM C-144-97) for the sand bed. This type of (fine) sand minimizes moisture loss from the sand bed. The cables must be positioned with at least 2" of compacted sand below the cables and 2" of compacted sand above the cables. The sub-base below sand bed can be sand, gravel, clay, engineered backfill, or native soils free of organic matter. Natural ground moisture or infrequent high water does not adversely effect the system, but moving water, such as underground springs and tidal fluctuations, or continuous standing water will significantly reduce system efficiency.

Due to the proximity of heavy machinery to the heating cables during cable installation and subsequent floor placement, there are risks of cable damage by such machinery. Workers must be cautioned to report any possible cable damage immediately so that necessary repairs can be made prior to completion of the pour. All repairs must be in compliance with standards established by the applicable code enforcement authorities.

## 3.0 Site Preparation and Heat Bank® Cable Installation

- 3.1 All underground plumbing and electrical utilities shall be routed in the sub-base and backfilled with well-compacted material. Structural footings, walls, piers, etc., adjacent to or within the sand bed must be completed.
- 3.2 Excavate the sand storage bank by grading this area to the design thickness of the sand bed below the underside of the slab. Remove stones or any other debris that may be present.
- 3.3 Insulate perimeter foundation walls with 2" Styrofoam™ Type SM or equivalent rigid closed cell



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extruded polystyrene. Extend to a depth below finished floor of at least 4 feet to reduce side heat loss. If foundation does not extend to this depth, it is recommended that insulation wrap around footing and continue downward without disturbing soil bearing. Where finished exterior grade is such that foundation is exposed (such as at loading docks), insulation thickness should be increased to 4".

- 3.4 For spooled cable, fill the graded area with the design thickness of compacted washed masonry sand. For mats, cover the graded area with about one third of the design thickness of the sand bank, but not less than 2". Use only fine sand for the storage bank.
- 3.5 TEST CABLES FOR CONTINUITY USING A METER SET TO AN OHMIC SCALE, AND TEST INSULATION RESISTANCE USING A 500VDC MEGGER PRIOR TO UNSPOOLING. Minimum insulation resistance reading between conductor and ground braid is 10 Megohms.
- 3.6 Install spooled heating cables in sand as per spacing from Spacing Chart. For mats, lay mats onto sand. Ensure that cables are not damaged during installation. Do not pull or bend cold lead factory splice. Care must be taken that cable does not bunch, kink, twist or overlap. Each spooled cable has a marking indicating the midpoint of the cable to use as a benchmark during the installation.
- 3.7 Do not install heating cable within 6" of any obstruction, such as plumbing, drains, conduits, structural members, etc.
- 3.8 The entire heating cable, including the cold lead factory splice, must be embedded in the sand at a uniform depth and must be installed with uniform spacing.
- 3.9 Install 3/4" (maximum) rigid metal or intermediate metal conduit for high limit thermostat. Close terminal end of conduit with threaded metal pipe plug or cap such that sensing bulb can be fully inserted to deadend. Attach the final 3–6" of conduit directly to a heating cable using vinyl electrical tape (do not use tie wraps). Choose a point of attachment:
  - At least 2 feet into the heating cable array.
  - Within the range of the 10-foot capillary tube.
  - That requires a single 90° conduit elbow/bend. (Multiple bends will impede bulb insertion.)
- 3.10 Install cold lead conduit(s) and pull cold leads through conduit. Identify all cold lead pairs. If for whatever purpose, factory labels are removed from cold leads, they shall be affixed to the branch circuit panel to identify the pertinent supply circuits.
- 3.11 Complete sand cover over mats, taking extreme care not to damage cable.
- 3.12 Compact sand to provide a homogenous, stable base for the slab.
- 3.13 IMMEDIATELY PRIOR TO CONCRETE POUR, RE-TEST CABLES FOR CONTINUITY AND INSULATION RESISTANCE.
- 3.14 Prior to the concrete pour, wet sand with a fine water spray to further compact the sand and prevent the concrete from curing too quickly. Continue to wet sand until fully and evenly saturated with water.

- 3.15 Install vapor barrier atop sand bed. Overlap sheeting at least 6". Apply additional sand (1") on top of vapor barrier to ensure adequate securement.
- 3.16 Install 3/4" (maximum) metal or PVC conduit for floor sensing thermostat. Close terminal end of conduit to exclude concrete and situate at the mid-level of the slab directly above the heating cable array and within the range of the 10-foot capillary tube.
- 3.17 IMMEDIATELY AFTER CONCRETE POUR, RETEST CABLES FOR CONTINUITY AND INSULATION RESISTANCE TO ENSURE THAT NO DAMAGE HAS OCCURRED DURING POUR. DO NOT ENERGIZE CABLES AT THIS TIME.
- 3.18 Allow minimum 2 weeks for concrete to cure prior to energizing cables.

**4.0 Cable Power Connection**

All wiring and installation of electrical equipment and devices comprising the Heat Bank system shall be in accordance with all requirements of the National Electric Code and all applicable local electrical and building codes, regulations, and inspection procedures.

The copper ground braid on each cable must be connected to a suitable equipment grounding conductor per Article 250 of the National Electric Code.

Install thermostats, ensuring sensor bulbs are fully inserted into their respective conduits. Whether used for switching duty or pilot duty, the two thermostats associated with each heating zone should be wired in series.

Connect power to system.

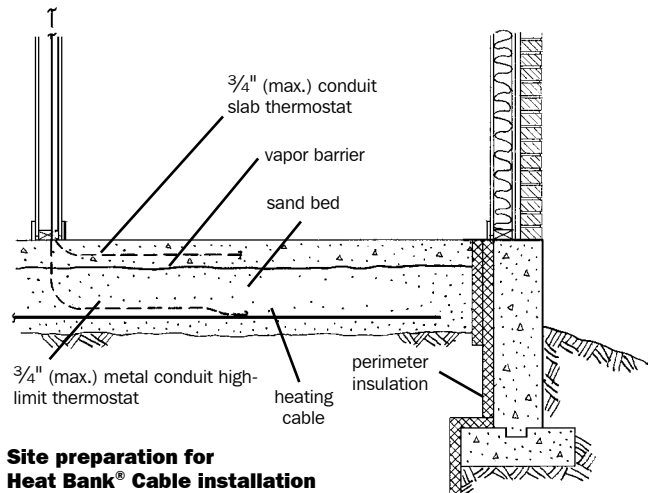
**5.0 Operating Tips**

At the beginning of the heating season, it may take several days for the sand bank to become fully charged.

Avoid the placement of thick carpets, low clearance furniture or stored containers/commodities on the concrete floor, as these will impede the flow of heat up through the floor.

**Storage Capability at Typical Cable Spacings**

CABLE SPACING	WATTS PER SQUARE FOOT	
	@240V	@208V
4"	24	18
6"	16	12
8"	12	9
10"	9.6	7.2
12"	8	6



**Site preparation for Heat Bank® Cable installation**