

SERGE BARIL HEAT TRACING SYSTEMS

MINERAL INSULATED SNOW MELTING CABLE INSTALLATION AND OPERATING INSTRUCTIONS



GENERAL INFORMATION

For Snow Melt Applications please also consult the most recent Application Manual HT-212.

WARNING:

<p>THE GUARANTEE ON THIS PRODUCT IS VOID IF THESE INSTRUCTIONS ARE NOT FOLLOWED</p>
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RECEIPT & STORAGE

Receipt

- Compare the materials against the shipping bill to verify receipt of proper materials.
- Inspect heater cable and components for transit damage. Insulation resistance tests on each cable set is recommended. Use at least 500VDC although 1000VDC megger test voltage is recommended. Insulation resistance should be 20 megohms minimum.
- If design documents (line lists or per circuit bills of material) exist, check the materials received against the lists to verify receipt of all needed materials. If no design documents exist, keep a receipt of all materials received.

Storage

Cables and system components should be stored in a clean, dry area. The equipment should be protected from mechanical damage during storage.

PACKAGING

Serge Baril MIC Cable is packed in special cartons for protection during shipment. Examine the packages for apparent damage. Also, examine the coils for concealed damages.

PRODUCT SELECTION

Check and verify that the proper heaters are being installed. If no design/installation documents exist, check Serge Baril's most recent Application Manual HT-212 to determine the proper design procedure.

UNCOILING

In straightening out the coils, before applying, it is desirable that the coil be unrolled along a floor or surface to avoid kinking or twisting. Since the cold section is larger and stiffer than the hot section, it will tend to bend the hot section near the splice if not handled carefully.

DRAWINGS

On engineered systems, drawings for all individual electric trace circuits may be provided for installation of heat tracing. An electric trace circuit number, a segment number, and a catalog number is assigned to each cable for identification purposes. Each installation drawing will have a complete bill of material, including cables, temperature controller, junction boxes, strapping material and electrical parameters.

The electrical parameters include a note to verify the circuit wiring - normally series connected.



INSTALLATION

Pre-Installation Check

Walk the designed system and plan the routing of the heater cable. Use this check to verify completion of instrumentation and mechanical work. All surfaces must be ready before attempting the heater cable installation.

Heater Handling

- When handling the heater cable, avoid pulling it over or installing against sharp edges.
- Do not kink or crush the heater cable; including walking on or driving over it with equipment.
- Unroll heater cable starting at the power connection end of the circuit.
- Keep the cable strung loosely, respecting the designed spacing.
- Attach cable to the metallic grid or reinforcement bars.

While there are many acceptable ways of installing Serge Baril electric heat tracing systems, certain actions can be dangerous to personnel and your installations.

Please take care to avoid the following problems:

- **INSTALL CABLE SO MINIMAL RE-BENDING IS REQUIRED TO SERVICE EQUIPMENT.** Cable will work harden and break if repeatedly re-bent.
- **DO NOT BEND THE HEATER CABLE TO AN INSIDE RADIUS OF LESS THAN FIVE TIMES THE CABLE'S DIAMETER.** This will damage the cable, and straightening at one point work-hardens and stretches the cable and could cause a break in the conductors. If necessary to straighten a severe bend, use a torch to anneal the sheath.
- **DO NOT BEND THE HEATER CABLE WITHIN 76.2mm (3") OF FITTINGS.** Fitting joints could be damaged.
- **HEATER CABLE SETS CANNOT BE RANDOMLY SWITCHED.** Each cable is designed for a specific wattage, predetermined length for a given surface, and type of pavement. Cables may not work in a different situation. Changes should be reviewed for design adequacy.
- **DO NOT OVERLAP HEATER CABLES IN HAZARDOUS AREAS.** Overlapped contact points will produce hotter spots that could exceed ignition temperatures.
- **HEATER CABLES FOR HAZARDOUS CLASSIFIED AREAS SHOULD BE TAGGED AS BEING CERTIFIED FOR A SPECIFIC AREA.** Sheath temperatures are controlled by design. Be sure the cable is designed for the proper temperature limits.
- **HAZARDOUS (CLASSIFIED) AREA (EXPLOSIVE DUST OR GAS) REQUIRE THE USE OF SPECIAL CONTROLS AND COMPONENTS.** Any area having explosive gases, (such as chemical or petrochemical installations), or explosive dust (such as coal handling or granaries), require connection components and controls that are approved for use in these areas. Installation of non-approved heaters can result in a fire or explosion.
- **LEAVE ALL TAGS ON THE CABLE.** They contain electrical, approval, and further installation information.
- **BOND THE METAL SHEATH OF THIS TRACE HEATER TO SUITABLE EARTH / GROUND TERMINAL.**
- **TERMINAL ENCLOSURES MUST BE CLASSIFIED** for the appropriate classes and groups when used in Class I, Division 1; Class II, Division 1 Hazardous locations and certified as flameproof when installed in Europe.

DO NOT INSTALL heating cable where exposure to **PVC or PVC based installation materials** is possible.



SERGE BARIL HEAT TRACING SYSTEMS

FOR SNOW MELT APPLICATIONS

INSTALLATION INSTRUCTIONS

A quality snow melting installation has three basic requirements:

Paving Quality Mineral Insulated snow melting cable is designed to last as long as the material in which it is embedded. Paving that crumbles, settles or separates will most likely damage the heating element. Always insist on quality paving materials and allow for adequate reinforcing steel, expansion joints and proper curing.

Electrical System The electrical system should provide an adequate watt density for the snowfall in your particular area. It should also provide for an adequate number of junction boxes and meet all CEC (Canadian Electrical Code) and local code requirements. All splice connections should be completely waterproof.

Installation Craftsmanship The electrical and paving contractors, working together, must take extra precautions to prevent damage to the heating cables by sharp objects such as tools, wheelbarrow, and footwear. Mineral Insulated cables are rugged, not indestructible.

To assure a long lasting, dependable snow melting system, please adhere to the guidelines and procedures outlined on the following pages.

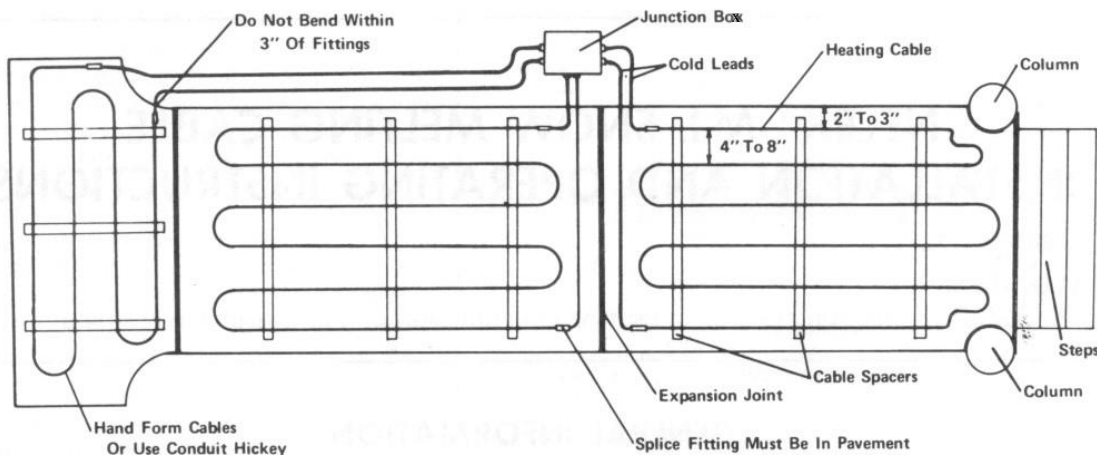


FIG. 1 TYPICAL SNOW MELTING SYSTEM

PAVING GUIDELINES

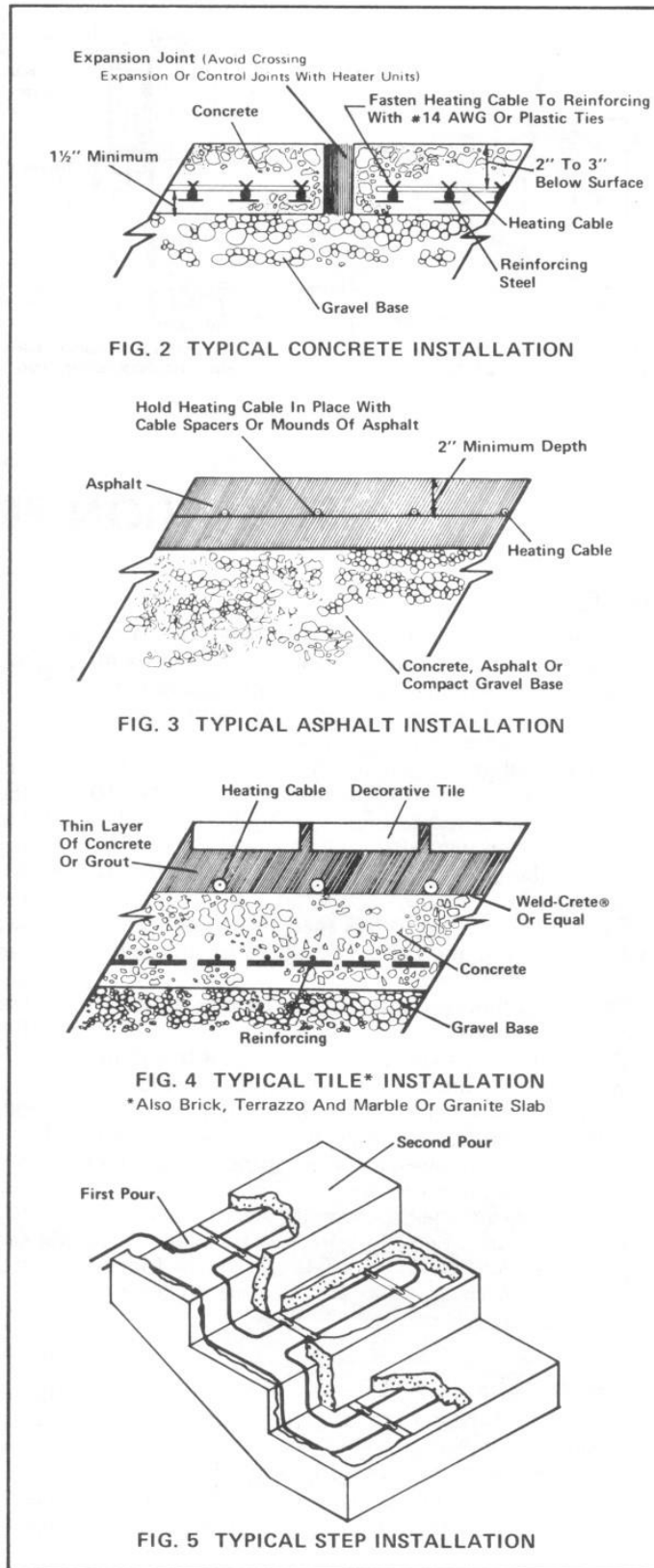
GENERAL

1. Drainage must be adequate for run off of melted ice or snow. The drain or grate should also be heated.
2. The base for the pavement should be smooth and compact.
3. Paving materials must be of first quality and strength.
4. Tree roots under paved areas represent potential problem areas. Take the proper precautions.
5. Local codes may govern. If in doubt check with building codes or a consulting engineer.



SERGE BARIL HEAT TRACING SYSTEMS FOR SNOW MELT APPLICATIONS

INSTALLATION INSTRUCTIONS



CONCRETE :

1. Paving thickness must be adequate to support a maximum load without crumbling, settling or excessive movement. A minimum thickness of 4" is recommended for pedestrian walkways and 6" for areas supporting motor vehicles.
2. Heater depth should be 2" to 3" below final surface. Too shallow may leave strips of ice. Too deep will require a longer heat up time.
3. Expansion joints must be provided for larger areas and for changes in slab thickness at curbs, walls, columns, steps, hydrants, lighting standards, manholes, etc. Scribed or control joints should be treated as expansion joints (see fig.1). For additional guidance, consult your local concrete supplier or a professional engineer.
4. Reinforcing must be supported or lifted to be a minimum 1/2" from bottom surface of concrete. Install reinforcing rods or mats at correct distance from final surface by use of concrete spacers, bricks, wire "chairs" or any suitable method to insure proper placement of reinforcing material. (See Fig. 2). Reinforcing should be a minimum of 6"x6" mesh of #8 AWG for sidewalks and 6"x6" mesh of #6 AWG for ramps and driveways. Lay out cable on top of rods or mesh but do not fasten until layout has been checked.
5. When location of all runs and bends is correct, fasten the cable to the rods or to the mesh with plastic straps or wire ties. If wire ties are used be sure they are not so tight that they nick or otherwise damage the cable.
6. Check each heater cable with a 500 Volt DC megger for insulation resistance to ground. Minimum resistance should be 20 megohms.
7. Pour the concrete carefully. Be sure that the chute is high enough and the speed of delivery is slow enough to drop the concrete in place without dislodging the cables.
8. During the pouring operation an electrician should be on hand to monitor the continuity of the cable with an ohmmeter or other test device and to stop the work if a cable is dislodged or damaged.
9. Locate junction boxes per plans or specs. Install any necessary conduit from panel board to junction boxes for power cable. Megger the cable one more time.
10. Do not energize the cable until concrete has completely cured.



SERGE BARIL HEAT TRACING SYSTEMS FOR SNOW MELT APPLICATIONS

INSTALLATION INSTRUCTIONS

ASPHALT:

1. A maximum of **15 watts per linear foot** of heater cable is recommended for asphalt installations.
2. In new construction, a minimum thickness (after compaction) of 4" is recommended for pedestrian walkways and 5" for areas supporting motor vehicles.
3. When capping over an existing pavement, careful preparation of the base slab is necessary. A minimum capping of 3" of asphalt (after compaction) is recommended for either sidewalk or driveway. Lay a 1" to 2" base course of asphalt over a compact sub base and roll smooth. See Fig. 3 on page 5. After spacing and anchoring cables into position, a small amount of asphalt should be put over the cables by hand and tamped to protect them from damage by tools or paving equipment during the laying of the finish course. The cables should be monitored with an ohmmeter throughout the installation of paving material - moving from cable to cable as work progresses. Should a cable be damaged in installation, replace it immediately. Asphalt rollers will not harm cables when properly covered.

NOTE: Asphalt capping over an existing concrete or asphalt base is not recommended unless such base is in very sound condition. Even then, be sure to position cables so as not to cross any existing expansion joints.

TILE, BRICK, TERRAZZO, MARBLE OR GRANITE SLAB:

1. Basic guidelines for concrete apply for base course.
2. After positioning cables, a good bonding agent should be applied to the base course.
3. Be careful not to damage cables when setting heavy slabs or brick into position.

PAVERS OVER A SAND BED:

1. Basic guidelines for concrete apply for base course.
2. Position cables on top of either the compacted or concrete base and cover with 1-1/2" to 2" of sand.
3. Be careful not to damage cables when setting pavers into position.

NOTE: Crossing expansion joint is NOT recommended. If joint must be crossed, see below.

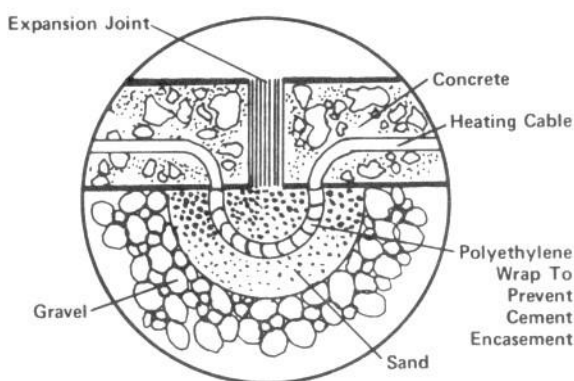


FIG 1-A METHOD OF CROSSING EXPANSION JOINT

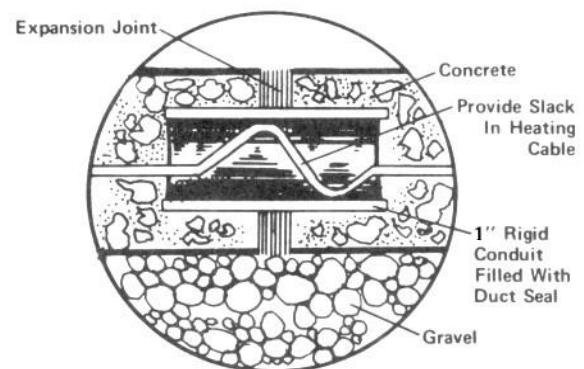


FIG. 1-B METHOD OF CROSSING EXPANSION JOINT



ELECTRICAL RATING REQUIREMENTS

Voltage Rating

Serge Baril MIC Cable is supplied in a variety of types and lengths. Actual applied voltage should be in accordance with the drawing, tag information and the technical information included in Serge Baril catalog or upon specific recommendations by Serge Baril & Ass. Inc. Verify that the heater cable voltage rating is suitable for the service used. Voltage and wattage ratings are printed on the cable tag.

Electrical Loading

Size over-current protective devices according to National or Canadian Electric Code as appropriate. If devices are other than standard thermal magnetic circuit breakers, consult factory.

Voltage Surge Protection

For voltages above 300V, surge protection should be installed at the breaker panel if the panel is not isolated from its 600V/480V supply by an isolation transformer.

Ground Fault Protection

Ground fault circuit breakers are required on all heater applications per the National or Canadian Electric Code - check code for proper circuit breaker protection. Typically, 30 ma trip devices are required due to the capacitive leakage of the heater cable and its associated power wiring.

Serge Baril strongly recommends that ground fault circuit breakers be used at all times in conjunction with the installation of heat tracers whether called for by the code or not.

Control

If manual control is used, an indicating light is recommended to be sure heaters are turned off when not needed.

JUNCTION BOXES AND CONDUIT SYSTEM

MI heating units with cold leads of any length are available from the factory to reach preferred junction box location.

- Preferred junction box location is indoors with three feet of cable accessible (See Fig. 1-C).
- Outdoor junction boxes should be at least three feet above grade. Box must be weatherproof with gasketed cover and drain hole. (See Fig. 1-D).
- Avoid junction boxes at grade level. If unavoidable, see Fig. 1-E for special treatment.
- Avoid using PVC or PVC based conduit and fittings in installations that may experience elevated temperatures. High amperage cables and multiple cold sections installed in a single conduit run are common examples of these installations.

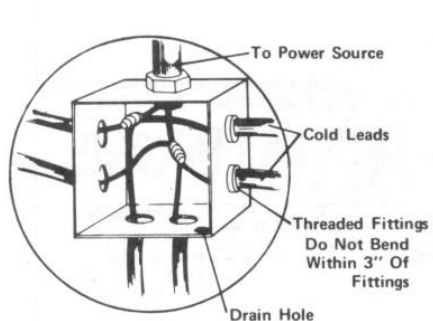


FIG. 1-C INDOOR PREFERRED
JUNCTION BOX LOCATION

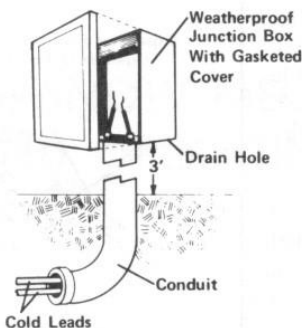


FIG. 1-D OUTDOOR ABOVE GRADE
JUNCTION BOX MOUNTING

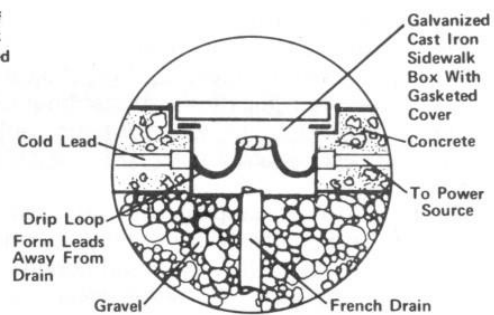


FIG. 1-E SIDEWALK JUNCTION BOX
ARRANGEMENT AT GRADE LEVEL



Waterproofing

Moisture penetration of the electric system is the single largest source of problems in a heater cable system installation. Therefore, particular care must be given to the proper sealing of all electrical connections. All electrical connections (heater pigtail leads to power wiring, fittings, thermostat connections, panel and breaker connections, etc.) should be sealed or moisture proofed. *See warning:*



WARNING:

Nuisance tripping of ground fault circuit breakers will occur unless all electrical connections are waterproofed

Moisture inside the electrical connection enclosure will cause both corrosion and electrical shorting problems. The potential for this type of problem can be greatly reduced by:

- Low point conduit drains - condensation from conduit can fill small enclosures.
- Proper sealing of all enclosure openings (use a proper gasket and/or weep hole to prevent water built up in the enclosure.
- Bottom conduit entry into enclosures should be installed so it does not carry water in the box.
- Keeping conduit fittings/pull box covers closed at all times.
- Keeping enclosure covers closed and secured as much as possible during installation sequence.
- Proper closing and sealing of enclosure covers to prevent leaking into the housing.
- Use of a moisture proofing/electrical spray sealant on the thermostat and electrical connections (including all metal parts) at completion of installation. 3M brand Scotchkote electrical insulating compound is excellent for this service. It has good adherence and does not become brittle and crack. Allow the first coat to dry about three minutes before the second coat.

TESTING

Recommendations

Electrical tests are recommended at specific points on the receipt and installation of heater cable. This periodic testing is designed to prevent the expenditure of wasted labor in the event of damage to the product. Installation costs of the cable are much greater than the heater cable. Quick identification of any heater cable damage is the most economic approach to an installation. An insulation resistance test is recommended at the following points of the installation process:

- UPON RECEIPT of the heater cable.
- IMMEDIATELY AFTER installation before pouring concrete or applying heater conducting cement, if used, or insulation installation.
- As part of a PERIODIC MAINTENANCE program.

Procedure

The insulation resistance test is used to check for damage to heater jacket. Connections for the megger are made to the pigtail wires & the metal sheath. Test should use at least a 500 VDC megger, however, a 1000 VDC megger test is recommended. Minimum acceptable readings should be 20 megohms per cable.

A record should be kept of the readings taken from the time the cable is first installed. A history of the insulation resistance reading can be helpful in spotting moisture ingress into the electrical system (by seeing a gradual decline in the insulation resistance) or physical damage to the heating cable (sharp decline in the insulation resistance). A sample record form is shown on page 11.



The Periodic Inspection Record Form may be used in one of two ways:

- ❑ One sheet per circuit. The results of periodic tests of a single circuit are posted in vertical columns, beginning on the left and working toward the right. This allows easy comparison of test values for up to seven test sequences on an individual circuit.
- ❑ One circuit per column. Test data for a single test sequence on as many as six circuits can be recorded on a single sheet.

OPERATION & MAINTENANCE

System Design Installation & Documentation

The heating cable system must be properly designed, installed and documented. This documentation should at least include cable lists and location identification documentation. As-built installation drawings provide the optimum maintenance tool. Test records should also be considered as part of the system documentation requirements.

Preventive Maintenance

A preventive maintenance program is needed which will encompass both visual and electrical checks of the system. These should be done not only before initial operation of the system, but also after any maintenance has been performed.

Periodic Inspections

- ❑ Inspect junction boxes, connection boxes, and thermostats for corrosion, moisture or foreign matter.
- ❑ Check tightness of electrical connections, proper electrical insulation of heating cable wires, adequacy of moisture seal on electrical connections.
- ❑ Check all thermostat capillaries to insure they are shielded from physical damage and secured properly.
- ❑ Verify that all thermostat power and probe leads are securely connected and on the correct terminal.
- ❑ Verify all enclosures, connection boxes, etc., covers are properly closed and that the thermostat is switching on & off by rotating knob set point back and forth, and on by measuring current flow in the circuit when the unit switches on. Reset the knob to the proper temperature after completion of the test.

Frequency

Inspections should be made prior to the start of the freeze season on snow melt systems.

Personnel Training

Qualified maintenance personnel must be used to maintain the system. It is recommended that periodic training programs be utilized to assist in keeping maintenance personnel up to date on equipment and procedures.

Warranty

Serge Baril Heat Tracing System Products are supplied with a limited warranty. Complete terms and conditions may be found on Serge Baril's website at www.baril.ca.



SERGE BARIL HEAT TRACING SYSTEMS

FOR SNOW MELT APPLICATIONS

INSTALLATION INSTRUCTIONS



PERIODIC INSPECTION RECORD

Snow melt system Circuits -							
Perform these checks as season requiring use approaches.							
Maintenance Checks							
Visual inspection inside connection box for corrosion, moisture, etc.	Initial						
	Date						
Damage or cracks (leaks) in seals, surfaces, etc.	Initial						
	Date						
Heating cable properly connected and grounded.	Initial						
	Date						
Thermostat checked for moisture, corrosion, set point, switch operation, and capillary damage.	Set Point						
	Initial						
	Date						
Megger tests performed at power connection, with both lead wires disconnected from power wiring.	Reading						
	Initial						
	Date						
Circuit voltage at power connection.	Reading						
Circuit amperage after 5 minutes	Reading						
	Reading						
All connections, boxes, and thermostats have been resealed.	Initial						
	Date						
REMARKS & COMMENTS							

Periodic Inspection Record



SERGE BARIL HEAT TRACING SYSTEMS

FOR SNOW MELT APPLICATIONS

INSTALLATION INSTRUCTIONS

1. Circuit No. _____

2. Receiving Documentation - Heater Cat. No's. _____

3. Receiving Testing:

A. Check for physical damage.

B. Resistance check --
between cold leads.

C. 500VDC megger check between leads
and sheath, 20 megohms minimum.

Date _____

O.K. _____ Damage _____

O.K. _____ /ft _____

Megohms _____

4. Post Installation Testing:

A. Resistance check --
between cold leads.

B. 500VDC megger check between leads
and sheath, 20 megohms minimum.

C. Visually check cable installation prior to
release for pavement installation.

Date _____

O.K. _____ /ft _____

Megohms _____

O.K. _____ Damage _____

5. Final Testing and Commissioning:

A. Circuit approved for testing by client.

B. 500VDC megger check between leads
and sheath, 20 megohms min. reading.

C. Energized Testing -- (All test data to be
within 10% of design data)

1. Circuit Voltage

2. Initial Current

3. Current after 15 minutes of operation.

Date _____

Approved _____

Megohms _____

DESIGN

ACTUAL

6. Circuit Acceptance:

This circuit has been tested and documented in accordance with the above itemized date. This circuit is approved by: **Contractor:** _____ Date: _____

CLIENT: _____ Date: _____



SERGE BARIL HEAT TRACING SYSTEMS FOR SNOW MELT APPLICATIONS

INSTALLATION
INSTRUCTIONS

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