



TTS™ Self-Regulating Heating Cable For Pipe Freeze Protection

Specifications

Product: TTS 5, TTS 8, TTS 10 (A) Open Specification

1.0 General:

Design, furnish and install a complete system of heaters and components approved by the Canadian Standards Association (CSA) specifically for pipe freeze protection heat tracing applications. The heat tracing system shall conform to the latest edition of the applicable requirements of the following codes and standards:

- Canadian Electrical Code(CEC)
- National Fire Protection Association (NFPA)
- Occupational Health and Safety Act(OSHA)
- National Electrical Manufacturers Association(NEMA)
- American National Standards Institute(ANSI)
- Institute of Electrical and Electronics Engineers(IEEE)
- National Electrical Code(NEC/NFPA 70)
- All applicable local codes and standards

2.0 Products:

2.1 Temperature ratings, watt densities, supply voltage:

The Heating cables shall be Self-Regulating in nature and vary their output in response to temperature variations along the length of a traced pipe. Self-regulating heating cable design shall be capable of maintaining process temperatures of up to 65 °C (150 °F) and maximum continuous exposure temperature of 85 °C (185 °F). Available watt densities shall be 16, 26, 33 W/m @ 10 °C (5,8,10 W/ft @ 50 °F). Available supply voltages shall be 110-120Vac and 208- 240Vac.

2.2 The Self-Regulating Heating Cable will have a minimum installation temperature of -51 °C (-60 °F) and a minimum bend radius of 32 mm(1.25”).

2.3 Cable must be capable of being cut to a desired length to accommodate the installation conditions and must form a continuous heating circuit.

2.4 Construction:

The cable construction shall consist of two parallel nickel plated copper bus wires (16 AWG), a radiation cross-linked semi-conductive heating matrix, a radiation cross-linked dielectric insulation, a tinned copper braid and a polyolefin over jacket.


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2.5 Performance tests:
2.5.1 Service life:

Long-term stability shall be established by the service life performance test per IEEE 515-2004. The TTS™ series of Self-Regulating Heating Cables must meet or exceed the IEEE 515, IEEE 515.1, CSA 130.1, CSA 130.2, CSA 130.3, CSA 138 standards and must be approved for use in ordinary and hazardous (classified) locations Class I, Division 2, Groups A, B, C, D and Class II, Division 2, Groups F, G.

2.5.2 TTS™ self-regulating heat trace cables must meet or exceed the following performance tests:

Abrasion Resistance	UL 1588 (8.3); IEEE 515.1 (4.3.4)
Cold Bend	CSA 130-3(6.2.9), IEEE 515.1 (4.2.10)
Deformation	CSA 130-3(6.2.7), IEEE 515.1 (4.2.8)
Dielectric Withstand	CSA 130-3(6.2.1), IEEE 515.1 (4.2.1)
Resistance to Impact	CSA 130-3(6.2.10.1), UL 1588 (8.2)
Resistance to Cutting	CSA 130-3(6.2.8), IEEE 515.1 (4.3.3)
Resistance to Crushing	CSA 130-3(6.2.7), UL 1588 (8.1)
Temperature	CSA 130-3(6.2.5.4.3), UL 1588 (9.1-9.3)
UV and Condensation	CSA 130-3(A.2), IEEE 515.1 (4.3.2)
Vertical Flame	CSA 130-3(6.2.14), UL 1588 (8.5)

2.5.3 The heating cables shall be qualified to withstand continuous submersion in water for 2000h (12 weeks) in accordance with the test requirements of CSA 130.3, section A.3 (Wet Location Applications) and IEEE 515.1-2004, section 4.3.1 (Increased Moisture Resistance Test).

3.0 Accessories:

Accessory kits like power connection gland kit without junction box 18-SXG, metallic power connection kit with junction boxes ECA-1-SR-SP, non-metallic power connection kit with junction box PCA-1-SR, metallic T splice kit ECT-2-SR, in-line splice kit HS-PBSK, T splice kit HS-TBSK, end termination kit ET-6C, shall be applied in the field.

3.1 Accessory kits and heating cable components shall be CSA approved or UL listed for use as part of the pipe freeze protection system.

4.0 Protection:

Heating cable circuit shall be protected by a ground fault device for equipment protection. This requirement is in accordance with section 62-300(4) of the C.E.C.

The system shall be protected by a 30 mA trip ground-fault circuit breaker.

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Heating cable must have a metallic braid or sheath according to section 62-300(2) of the C.E.C. The metallic braid or sheath of each heating cable shall be bonded to ground in accordance with section 62-308(3) of the C.E.C.

6.0 System Control:**6.1 Option 1: Manual Control**

The system shall be controlled by a switch, either directly or through an appropriate contactor.

6.2 Option 2: Thermostatic Control-Ambient Sensing

The system shall be controlled by an ambient sensing thermostat. Choose either R1-050-DP (indoor installation*) with an adjustable range from 0C to 50C or R3C-0120-DP (outdoor installation) with an adjustable range from 0 °C to 120 °C. Both thermostats have a 10ft long capillary.

6.3 Option 3: Thermostatic Control-Line Sensing

The system shall be controlled by a line-sensing thermostat. Choose either R1-050-DP (indoor installation)* with an adjustable range from 0 °C to 50 °C or R3C-0120-DP (outdoor installation) with an adjustable range from 0 °C to 120° C. Both thermostats have a 10ft long capillary.

* The R1-050-DP housing should be in a protected indoor location; the capillary can be extended into an outdoor environment

7.0 Execution**7.1 Installation**

7.1.1 System (including heat trace cable and accessories) must be installed per manufacturer's recommendations and installation instructions.

7.1.2 Apply the heating cable linearly on the pipe after piping has been successfully pressure tested. For plastic pipes apply aluminium tape on top of the cable and hold cable in place with glass cloth tape.

7.1.3 Apply "electric traced" labels to the outside of the thermal insulation.

8.0 Testing:

8.1 Heating cable shall be tested with a 2500V dc megohmmeter between the heating cable bus wires and the metallic braid, before installation on pipe, after installation on pipe and completion of all accessory kits (in-line splices, T-splices etc), after installation of thermal insulation but prior to connecting to power.

8.2 The minimum acceptable level for the megger readings is 20 megohms, regardless of the circuit length. Test results must be recorded and submitted to the construction manger.

9.0 Installation assistance:

Technical assistance at installation available upon request in advance.


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**(B) Closed Specification:
Engineering/Architectural**

Heat tracing for pipe freeze protection shall utilize 3M Self Regulating Heating Cables TTS 5-1, TTS 5-2, TTS 8-1, TTS 8-2, TTS 10-1, or TTS 10-2. The selection of the cable shall be done in accordance with the 3M™ Design Guide for Pipe Freeze Protection. The maximum circuit length will be established based on breaker size and start-up temperature as per the following table.

110-120 Vac Service Voltage			Max. Circuit Length vs. Breaker Size Ft (m)				208-240 Vac Service Voltage			Max. Circuit Length vs. Breaker Size Ft (m)			
Catalog Number	Start-up Temp. °C (°F)	15A	20A	30A	40A	Catalog Number	Start-up Temp. °C (°F)	15A	20A	30A	40A		
TTS 5-1	10 (50)	190 (58)	270 (82)	275 (84)	275 (84)	TTS 5-2	10 (50)	380 (116)	530 (162)	550 (168)	550 (168)		
	-18 (0)	125 (38)	170 (52)	275 (84)	275 (84)		-18 (0)	245 (75)	335 (102)	550 (168)	550 (168)		
	-29 (-20)	105 (32)	145 (44)	240 (73)	275 (84)		-29 (-20)	215 (66)	295 (90)	475 (145)	550 (168)		
	-40 (-40)	95 (29)	130 (40)	210 (64)	275 (84)		-40 (-40)	195 (59)	265 (81)	420 (128)	550 (168)		
TTS 8-1	10 (50)	150 (46)	205 (63)	220 (67)	220 (67)	TTS 8-2	10 (50)	295 (90)	410 (125)	435 (133)	435 (133)		
	-18 (0)	100 (30)	140 (43)	220 (67)	220 (67)		-18 (0)	205 (63)	280 (85)	435 (133)	435 (133)		
	-29 (-20)	90 (27)	125 (38)	200 (61)	220 (67)		-29 (-20)	185 (56)	250 (76)	400 (122)	435 (133)		
	-40 (-40)	85 (26)	115 (35)	180 (55)	220 (67)		-40 (-40)	165 (50)	225 (69)	360 (110)	435 (133)		
TTS 10-1	10 (50)	115 (35)	160 (49)	195 (59)	195 (59)	TTS 10-2	10 (50)	230 (70)	320 (98)	390 (119)	390 (119)		
	-18 (0)	80 (24)	115 (35)	180 (55)	195 (59)		-18 (0)	165 (50)	225 (69)	360 (110)	390 (119)		
	-29 (-20)	75 (23)	100 (30)	160 (49)	195 (59)		-29 (-20)	150 (46)	205 (63)	325 (99)	390 (119)		
	-40 (-40)	70 (21)	95 (29)	145 (44)	195 (59)		-40 (-40)	140 (43)	190 (58)	295 (90)	390 (119)		



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3M Canada Company
Electrical Markets Division
PO Box 5757
London, ON, N6A 4T1

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