Drexan Energy Systems Inc.

SPECIFICATION

Self-Regulating Heating Cable

PipeGuard® Warm

CONTENTS

1. SCOPE

This specification covers the requirements for self-regulating heating cables for pipe tracing and roof de-icing applications.

2. PRODUCTS

2.1 OVERVIEW

2.1.1 Self-regulating heating cable shall vary its power output relative to the temperature of the surface of the pipe or vessel. The cable shall be designed such that it can be crossed over itself and cut to length.

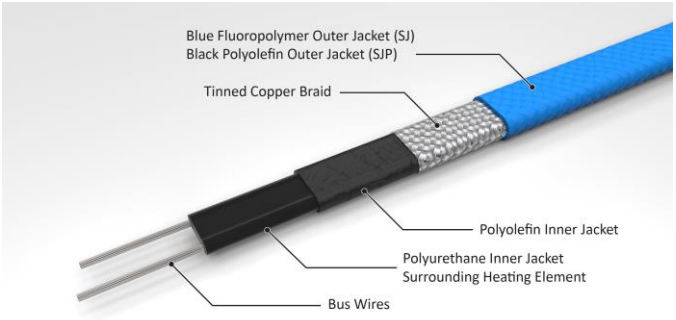
2.1.2 All cables shall be capable of passing a 1.5 kV dielectric test for one minute after undergoing a 7 J impact (CSA C22.2. No. 130-03, 6.2.10).

2.1.3 The heating cable shall be PipeGuard self-regulating heater, with the continuous exposure (maintain) capacity up to 150°F/65°C and intermittent exposure capability up to 185°F/85°C.

2.2 CONSTRUCTION

2.2.1 The heating cable shall consist of two 16 AWG or larger tin-plated copper bus wires, embedded in a self-regulating polymeric core that controls power output so that the cable can be used directly on plastic or metal pipes. Cables shall have a temperature identification number (T-rating) of T6 (185°F/85°C) without use of thermostats. The heating cable shall have a tinned copper braid with a resistance less than the heating cable bus wire resistance as specified in ASTM B193 (CSA C22.2, No. 130-03 Clause 4.3.4.1).

2.2.2 The braid shall be protected from chemical attack and mechanical abuse by a modified polyolefin or fluoropolymer outer jacket.



2.3 PRODUCT CHARACTERISTICS

2.3.1 Minimum bend radius @ 68˚F/20˚C	
• PG-SJ / PG-SJP	1.18 in. (30 mm)
2.3.2 Weight (nominal)	
• PG-SJ	0.87 lb./10 ft. (130 g/m)
• PG-SJP	0.84 lb./10 ft. (125 g/m)
2.3.3 Cable dimensions	
• PG-SJ	0.50 x 0.22 in. (12.8 x 5.5 mm)
• PG-SJP	0.51 x 0.22 in. (13.0 x 5.7 mm)
2.3.4 Bus wire size	
• PG-SJ / PG-SJP	16 AWG
2.3.5 Outer jacket color	
• PG-SJ	Blue
• PG-SJP	Black
2.3.6 Supply Voltage	
• PG-1SJ / SJP	100-130 VAC
• PG-2SJ / SJP	208-277 VAC

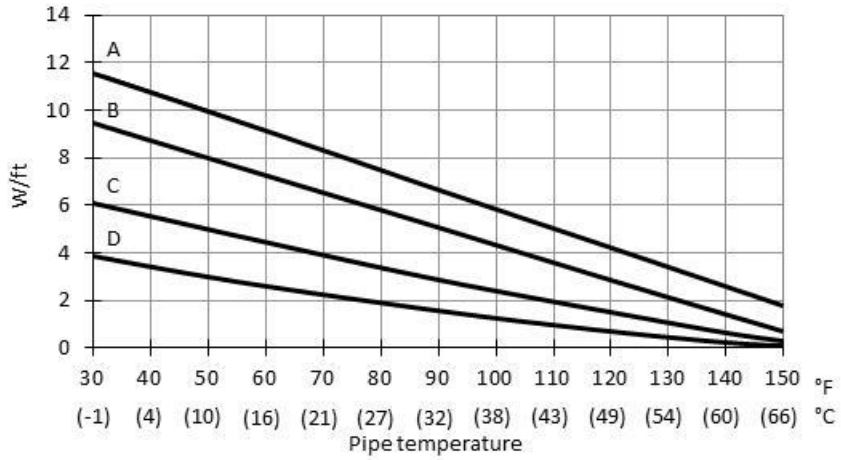
2.4 TEMPERATURE RATINGS

2.4.1 Maximum Continuous Exposure Temperature (power on)	150˚F/65˚C
2.4.2 Maximum Intermittent Exposure Temperature (power-on)	185˚F/85˚C
2.4.3 Temperature ID Number (T-Rating)	T6: 185˚F/85˚C Temperature ID numbers are consistent with applicable electrical codes
2.4.4 Minimum Installation Temperature	-40˚F/-40˚C

2.5 NOMINAL POWER OUTPUT RATING AT 120V/240V

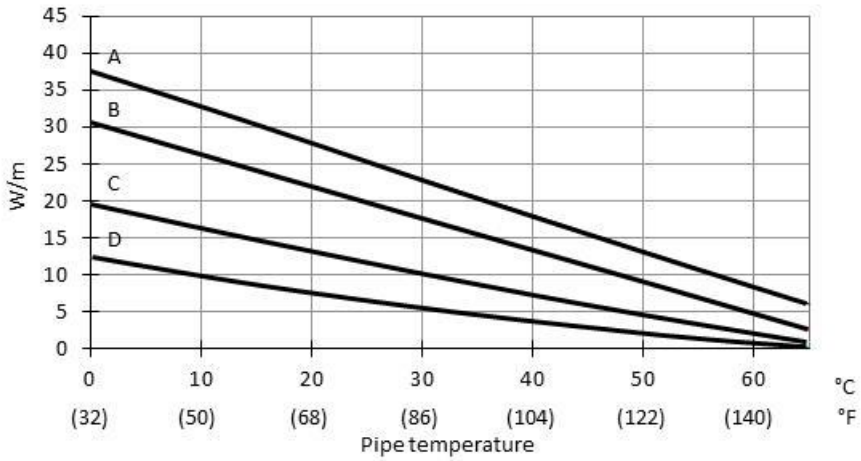
[A] 10-1, 10-2
10.0-12.2 W/ft. @ 50˚F
33-40 W/m @ 10˚C

[B] 8-1, 8-2
8.0-9.8 W/ft. @ 50˚F
26-32 W/m @ 10˚C



[C] 5-1, 5-2
5.0-6.4 W/ft. @ 50˚F
16-21 W/m @ 10˚C

[D] 3-1, 3-2
3.0-4.0 W/ft. @ 50˚F
10-13 W/m @ 10˚C



2.6 ADJUSTMENT FACTORS

	Power Output	Circuit Length
208V		
3-2	0.82	0.96
5-2	0.89	0.93
8-2	0.94	0.89
10-2	0.96	1.06
277V		
3-2	1.21	1.06
5-2	1.14	1.09
8-2	1.07	1.11
10-2	1.07	0.94

2.7 MAXIMUM CIRCUIT LENGTH BASED ON CIRCUIT BREAKER SIZES

For on metal pipes

Maximum continuous circuit length per circuit breaker (feet)

MAXIMUM CONTINUOUS CIRCUIT LENGTH (FT.) PER CIRCUIT BREAKER	START-UP AMBIENT TEMP		120V				240V			
	(F)	(C)	15A	20A	30A	40A	15A	20A	30A	40A
3-SJ / SJP	50	10	335		340	345	653	655	662	665
	0	-18	210	267			403	525		
	-20	-29	180	243			348	448	660	
	-40	-40	160	210	320		310	407	615	
5-SJ / SJP	50	10	235	272	272	272	465	545	545	545
	0	-18	155	192			290	385		
	-20	-29	133	160	255		250	335	505	
	-40	-40	115	146	225		235	301	445	
8-SJ / SJP	50	10	155	202	215	215	303	403	427	427
	0	-18	105	135	203		195	267	404	
	-20	-29	90	120	180		178	240	355	
	-40	-40	85	110	158		155	235	320	
10-SJ / SJP	50	10	125	157	182	183	243	315	365	365
	0	-18	80	112	163	180	155	220	325	
	-20	-29	70	93	140		148	190	282	
	-40	-40	65	85	125		127	175	255	343

3. TESTING

3.1 INSPECTION ITEM AND FREQUENCY

- Product code — All
- Product length — All
- Appearance — All
- Cable dimension (width and thickness) — Each lot
- Power Output — Each coil
- Dielectric withstand — All
- Insulation resistance — All

3.2 INSPECTION REPORT

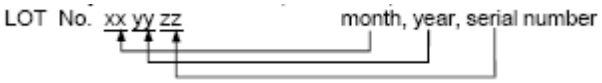
The inspection report, that is written with the test results (as described above) is attached to the product for each shipment.

4. MARKINGS

DREXAN VANCOUVER CANADA V6E 4L7 HEATTRACER PIPEGUARD w-vSJ [or SJP] PARALLEL HEATING CABLE MAX xxxVAC 32A vW/FT @50F (zzW/M@10C) [CSA] CUS HAZLOC CI D1/2 GRP A,B,C,D CII D1/2 GRP E,F,G CIII T6 –G,-W (or –WS for SJP), CE 2503 12ATEX3095X Ex II 2G Ex e IIC T6 Gb MIN INSTALL -40C WARNING: REFER TO INSTALLATION INSTRUCTIONS LOT No. xxyyzz ####M I (####FT on other side)

- The address and trademark is "DREXAN VANCOUVER CANADA V6E 4L7 HEATTRACER"
- The model and reference number, as:
  (a) PG: "PIPEGUARD **w-v**SJ [OR SJP] PARALLEL HEATING CABLE" (see chart)
- The rated voltage and the rated current, as "MAX xxxVAC 32A" (see chart)
- The rated wattage, as "yW/FT @ 50F (zzW/M @ 10C)" (see chart)
- The CSA trademark, class and division as:
  (a) PG: "[CSA monogram] CUS HAZLOC CI D1/2 GRP A,B,C,D,CII D1/2 GRP E,F,G CIII
- The Max surface temperature code as "T6"
- The environmental classifications as:
  (a) PG-SJ: "-G, -W"
  (b) PG-SJP: "-G, -WS"
- ATEX markings as: CE 2503 12ATEX3095X Ex II 2G Ex e IIC T6 Gb
- The Min. install temperature as: MIN INSTALL -40C
- The words "WARNING: REFER TO INSTALLATION INSTRUCTIONS"
- The month and year of manufacture, date code, as "LOT No. xxyyzz".

Note:



- The spool length index as "####M I" (####FT I on the other side)

Model	**w-v** SJ/SJP	**xxx** VAC	**y** W/ft.	**zz** W/m
3-1	3-1	120	3	10
5-1	5-1		5	16
8-1	8-1		8	26
10-1	10-1		10	33
3-2	3-2	277	3	10
5-2	5-2		5	16
8-2	8-2		8	26
10-2	10-2		10	33

5. PACKING

Ends of each product must be covered by end caps. For packaging, customer specified label must be applied to the carton box.

6. GENERAL

Furnish, install and commission a complete ANSI/IEEE Std. 515 (U.S.) or CSA/CUS Std. C22.2 No 130-03 certified trace heating system comprising self-regulating heating cables, connection components, and monitoring and control panels for the purposes of:

a. **Freeze protection** for any pipes containing water (or water mixture), including sprinkler mains and lines;
b. Viscosity control for ease of flow for fuel oil, grease and other higher specific gravity products
c. Any other process line, tank or accessory requiring a safe, easily installed heat source.

6.1 PIPEGUARD WARM SELF-REGULATING HEATING CABLE.

a. Construction - self-regulating heating cable shall be:
   I. A parallel circuit consisting of (or comprising) two (2) 16 AWG main bus wires nickel copper extruded within in a semi-conductive, self-regulating polymeric core.
   II. The cable shall be capable of being cut to length and powered and terminated in the field by qualified personnel.
   III. The polymeric core shall be encased in a radiated cross-linked, modified polyolefin dielectric jacket. The dielectric jacket shall have a tinned copper wire shield (braided) encased in an outer jacket of either modified polyolefin (SJP) or fluoropolymer (SJ).
   IV. Outer jacket material to be specified as follows.
      - For water service, the outer jacket shall be modified polyolefin (SJP).
      - For service where the cable jacket is exposed or could potentially be exposed to hydrocarbons (fuel lines, grease lines) the outer jacket shall be fluoropolymer (SJ).

b. Performance:
   I. Wattage output of self-regulating cables shall vary along the linear length of the cable in response to, and in direct proportion to the temperature in immediate proximity (or in contact with) the cable.
   II. Tolerances: Rated output (as certified by CSA) shall be -0% to +10% of published rated output as stated in catalogue and so marked on cable.
   III. The cable shall be capable of operating at 120, 208. 220, 240, or 277 volts without use of a transformer.

c. Warranty: Self-Regulating Cable shall be furnished with a standard 3-year warranty against defects in workmanship and product quality.

6.2 COMPONENTS

Drexan HeatTracer power connections, splices and end seals must be used, as per installation instructions, with the Drexan HeatTracer Cables to ensure product performance criteria and to comply with requirements of warranty, codes and approvals.

The connections components shall be one of the following varieties:

i. Heat shrinkable
ii. Metallic assemblies
iii. Polymeric quick connections

6.3 MONITORING AND CONTROL (CHOOSE EITHER a. or b.)

a. Electronic Monitoring and Control Panel: **RECOMMENDED**
A programmable, solid-state Trace Heating Monitoring and Control Panel shall be installed to provide the following System Fault Alarms:

i. Breaker off or tripped.
ii. Heater continuity or low current.
iii. Ground fault trip.
iv. Low temperature.
v. High temperature.
vi. Sensor fault.
vii. The panel shall include:
- DC or AC alarm output for PLC or remote alarm indication.
- A viewable LED Alarm indicator shall be on the door of the enclosure.
- The panel shall be a weatherproof, NEMA-4X enclosure.
- The panel shall exercise dormant heat tracing systems every 24 hours for early warning to prevent shut-downs.

b. Mechanical Thermostat Control: ACCEPTABLE ALTERNATE
A fixed set point or adjustable thermostat shall be installed to control the heater either directly or through a contactor. The thermostat may be either ambient or line sensing.

Note: Alarm relays: where required by applicable law, alarm outputs may also be required.

Note: In all applications the heating cable circuit shall be protected with ground fault equipment in accordance with National and Canadian Electrical Codes.

7. INSTALLATION AND COMMISSIONING

7.1 Trace heating cable and cable connection components shall be installed in accordance with Manufacturer's Installation Instructions, including compliance with maximum circuit lengths for the selected breaker size and the design ambient start-up conditions.

7.2 Heating cable shall be affixed to piping using fiberglass tape or nylon cable ties. Polyvinyl electrical tape and metallic pipe straps shall not be used.

7.3 Safety labels shall be affixed to the exterior of the insulated line.

7.4 The system shall be considered acceptable when all of the following conditions are met:

a) Heating cable has been correctly installed
b) Connection components have been correctly installed
c) Trace heating lines are insulated
d) The monitoring and control panel has been correctly installed
e) The monitoring and control panel has been correctly programmed
f) Power has been applied to the trace heating control panel
g) The trace heating control panel shows no alarms
h) All of the above are certified by a representative of the manufacturer or an approved contractor

Note: If thermostat and ground fault breaker are installed, then continuity must be confirmed after installation of insulation.