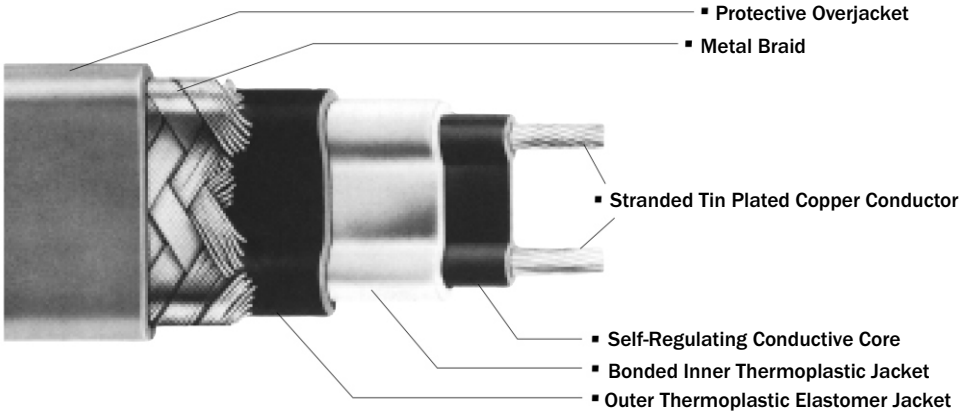
A ON PIPE
CCA family of heating cables

FREEZE PROTECTION HEATING CABLES FOR POTABLE WATER SUPPLY LINES

3, 5, 6 or 8W/ft
10, 16, 20 or 26W/m



THE PROBLEM:

Water supply pipe either not deep enough in the ground or installed on the surface, both leading to a potential pipe freeze-up.

THE SOLUTION:

Installing the CCA family of heating cable on the outside of the pipe and covering it with adequate insulation. The pipe must be insulated with fibreglass or equivalent insulation. The insulation must be covered with a waterproof jacket. Remember, wet insulation is conductive and worse than no insulation.

OTHER TYPICAL APPLICATIONS:

- ➤ Pipe & tank freeze protection
- ➤ Maintain temperature in product pipelines
- ➤ Sprinkler freeze protection
- ➤ Hot water systems
- ➤ Drains, roofs & gutters
- ➤ Comfort and space heating

NOTE: Please consult SBA for the appropriate publication to your application.

PRINCIPLE OF OPERATION:

The parallel bus wires apply voltage along the entire length of the heater cable. The conductive core provides an infinite number of parallel conductive paths permitting the cable to be cut to any length in the field with no dead or cold zones developing. The heater cable derives its self-regulating characteristic from the inherent properties of the conductive core material. As the core material temperature increases, the number of conductive paths in the core material decreases, automatically decreasing the heat output. As the temperature decreases, the number of conductive paths increases, causing the heat output to increase. This occurs at every point along the length of the cable, adjusting the power output to the varying conditions along the pipe. The self-regulating effect prevents damage to even an empty pipe. As the cable self-regulates its heat output, it provides for the efficient use of electric power, producing more heat when and where it is needed, and also limiting the maximum sheath temperature of the cable.

MAXIMUM EXPOSURE TEMPERATURE:

- **Energized 150°F (65°C)**
- **De-energized 185°F (85°C)**

ADVANTAGES:

- ➤ **Cut to length for the project.**
- ➤ **Reduced electrical costs.**
- ➤ **Adjusts its power output where and when it is required.**
- ➤ **Very flexible, therefore easier to install.**
- ➤ **Can be used with or without thermostat.**
- ➤ **Can be installed on all types of water lines.**

STEP 1 Design Information

The following information is required in order to determine the length and type of cable required:

- Diameter of the pipe
- Length of the pipe
- Minimum ambient temperature
- Number, type, and length of valves, if applicable
- Thickness of insulation based on fibreglass (for other types, consult your Serge Baril representative)
- Number of flanges and uninsulated supports, if applicable

Note: This design is for water pipes only and using fibreglass insulation. For process temperature maintenance or for use of other insulation materials consult our design guide (HT-201) for heat tracing of pipes and vessels.

STEP 2 Choice of CCA heater

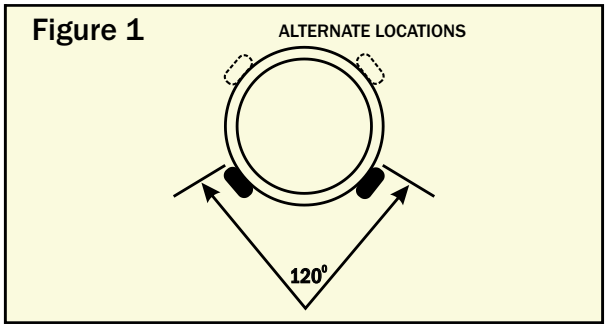
***Table1** provides the CCA heater cable selection to maintain 40°F(5°C) on a metal or plastic pipe with the use of fiberglass or equivalent insulation. It shows three types of installation and should be read as follows:*

METAL PIPES:

HEATER CABLE INSTALLED ON THE METAL PIPE

For the choice of CCA heater per pipe diameter and insulation thickness refer to **TABLE 1, COLUMN I.** For the length of heater required, see the formula at STEP-3. The cable uses components as listed on **page 9** and is attached at 1 ft (300 mm) intervals with fiberglass tape (GT-60). It is positioned as shown in **FIGURE 1.**

Figure 1



PLASTIC PIPES:

CAUTION

Certain plastic pipe materials have low maximum allowable temperatures. Contact your local Serge Baril representative to verify if the use of an uncontrolled (no thermostat) heater application is appropriate or recommended given the specific pipe material and the rated maximum temperature.

THERE ARE TWO CHOICES OF INSTALLATION FOR A PLASTIC PIPE:

1. ***HEATER CABLE INSTALLED DIRECTLY ON THE PLASTIC PIPE***

   For the choice of CCA heater per pipe diameter and insulation thickness refer to **TABLE 1, COLUMN II.** For the length of heater required, see the formula at **STEP-3.** The cable uses components as listed on **page 9** and is attached at 1 ft (300mm) intervals with fiberglass tape (GT-60). It is positioned, as shown in **FIGURE 1.**

2. ***HEATER CABLE INSTALLED ON PLASTIC PIPE AND COVERED LENGTHWISE WITH ALUMINUM TAPE***

   The use of aluminum tape (AT-150) installed lengthwise on the heater helps dissipate the heat thus requiring fewer watts per foot. For the choice of CCA heater per pipe diameter and insulation thickness refer to **TABLE 1, COLUMN III.** For the length of heater required, refer to the formula at **STEP-3.** The cable uses components as listed on **page 9**. It is positioned, as shown in **FIGURE 1.**

STEP 2 Continued

Table 1 QUICK SELECTION GUIDE

KEY	A = 3CCA		B = 5CCA			C = 6CCA			D = 8CCA			
Insulation Thickness	Pipe Diameter (inch / mm)		Minimun Ambient Temperature									
			14°F / -10°C			-4°F / -20°C			-22°F / -30°C			-40°F / -40°C		
			I	II	III	I	II	III	I	II	III	I	II	III
1/2 inch 12 mm	1/2	12	A	A	A	A	A	A	A	B	A	A	B	A
	3/4	18	A	A	A	A	A	A	A	B	A	B	C	B
	1	25	A	A	A	A	B	A	B	B	A	B	D	B
	1 1/4	30	A	A	A	A	B	A	B	C	B	B	D	B
	1 1/2	38	A	A	A	B	B	B	B	D	B	C	2B	C
	2	50	A	B	A	B	C	B	B	2B	B	D	2C	D
	2 1/2	62	A	B	A	B	D	B	C	2B	D	D	2D	2B
	3	75	B	C	B	C	D	C	D	2C	2B	2B	2D	2B
	4	100	B	D	B	D	2C	D	2B	2D	2B	2C	3D	2D
	6	150	B	2C	D	2B	2D	2C	2C	3D	2D	3C	4D	3C
1 inch 25 mm	1/2	12	A	A	A	A	A	A	A	A	A	A	A	A
	1	25	A	A	A	A	A	A	A	A	A	A	B	A
	1 1/2	38	A	A	A	A	A	A	A	B	A	B	C	B
	2	50	A	A	A	A	A	A	B	B	B	B	C	B
	2 1/2	62	A	A	A	A	B	A	B	C	B	B	D	B
	3	75	A	A	A	A	B	B	B	D	B	C	D	C
	4	100	A	B	A	B	C	B	B	2B	D	D	2C	D
	6	150	B	B	B	B	D	C	D	2D	2B	2B	2D	2B
	8	200	B	D	B	D	2C	D	2B	2D	2B	2C	3D	2D
	10	250	B	2B	C	D	2D	2B	2C	3D	2D	2D	4C	3C
	12	300	C	2B	D	2B	3C	2C	2D	4D	3B	2D	4D	3D
1 1/2 inch 38 mm	1 1/2	38	A	A	A	A	A	A	A	A	A	A	B	A
	2	50	A	A	A	A	A	A	A	B	A	A	B	A
	4	100	A	A	A	A	B	A	B	C	B	B	D	B
	6	150	A	B	A	B	D	B	B	2C	C	D	2C	D
	8	200	A	B	B	B	2B	B	C	2C	D	D	2D	2B
	10	250	B	C	B	C	2B	D	C	2D	2B	2B	3C	2C
	12	300	B	D	B	D	2C	2B	2B	3C	2C	2C	3D	2D
	14	350	B	2B	B	D	2D	2B	2B	3C	2C	2D	3D	2D
	16	400	B	2B	C	D	2D	2B	2C	3D	2D	2D	4D	3C
2 inch 50 mm	2	50	A	A	A	A	A	A	A	A	A	A	B	A
	4	100	A	A	A	A	A	A	A	B	B	B	C	B
	6	150	A	A	A	A	B	B	B	D	B	B	2B	C
	8	200	A	B	A	A	D	B	B	2B	C	D	2C	D
	10	250	A	B	A	B	D	B	C	2C	D	D	2D	2B
	12	300	A	C	B	B	2B	C	D	2D	2B	2B	3C	2B
	14	350	A	C	B	B	2B	C	D	2D	2B	2B	3C	2C
	16	400	B	D	B	D	2C	2B	2B	3C	2C	2C	3D	2D
3 inch 75 mm	4	100	A	A	A	A	A	A	A	B	A	A	B	A
	6	150	A	A	A	A	B	A	A	B	B	B	D	B
	8	200	A	A	A	A	B	A	B	D	B	B	D	B
	10	250	A	B	A	B	C	B	B	D	B	C	2B	C
	12	300	A	B	A	B	D	B	B	2B	C	D	2C	D
	14	350	A	B	A	B	D	B	B	2B	D	D	2C	2B
	16	400	A	B	B	B	2B	C	C	2C	2B	D	2D	2B
	18	450	A	C	B	B	2B	C	C	2D	2B	2B	3C	2B
	20	500	B	C	B	B	2B	D	C	2D	2B	2B	3C	2C

To use only the 6CCA heater for all jobs:

NOTE: If one chooses to use only the 6CCA heater, replace above key by:

A = 6CCA B = 6CCA C = 6CCA D = 2 x 6CCA
2C = 2 x 6CCA 3C = 3 x 6CCA 2D = 3 x 6CCA

STEP 2 Choice of CCA heater - Continued

HEATER SELECTION - CATALOG NUMBER

X CCA X BA

- **3 5 6 8** watts/ft at 50°F (10°C) on metal pipe
- **CCA** family of heating cables
- **BA** copper braid and protective overjacket **ex:** 3CCA-1BA
- **X**
  - **1** = 120V
  - **2** = 208 / 220 / 240 / 277V

STEP 3 Length formula

TOTAL LENGTH OF HEATER REQUIRED = Pipe length (in ft or m) + 1 foot (0.3m) for the connection

add if applicable

+ 4x number of gate valves x length of valve in ft or m
+ 2x number of ball or butterfly valves x length of valve in ft or m
+ 2x number of flanges x diameter of pipe in ft or m

STEP 4 Circuit breaker selection

The circuit breaker is selected on the basis of the maximum length (ft or m) that can be connected at a specific start-up temperature. The maximum heater segment is the longest length of heater allowable between the power connection point and the end seal. More than one segment can be connected to a single breaker as long as the maximum heater length per breaker size is not exceeded (see example on page 8).

CAUTION: To minimize the danger of a wet wire fire (arcing fault) if the heating cable is damaged or improperly installed, both the Canadian and the National Electrical Code (NEC 1996) require the use of a ground fault protection device (GFPD) at all times in conjunction with the installation of heat tracers.

Table 2 Maximum heater segment length

CABLE	120 Volts		240 Volts*	
	ft	m	ft	m
3CCA	221	67	533	163
5CCA	178	54	458	140
6CCA	165	50	425	130
8CCA	142	43	347	106

*** For 208, 220 or 277V, please contact SBA**

STEP 4 Circuit breaker selection - Continued

Table 3 Maximum heater length Vs Breaker size

Heater	Start-up Temp.	120 Volts								240 Volts**							
		15A		20A		30A		40A		15A		20A		30A		40A	
	°F / °C	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
3CCA	40 / 5	268*	82*	358*	109*	537*	164*	715*	218*	537*	164*	716*	218*	1074*	327*	1432*	437*
	-4 / -20	203	62	271*	83*	407*	124*	542*	165*	407	124	542*	165	814*	248*	1085*	331*
	-22 / -30	185	56	247*	75*	370*	113*	494*	151*	370	113	494	151	741*	226*	987*	301*
	-40 / -40	170	52	226*	69*	240*	104*	453*	138*	340	104	453	138	679*	207*	906*	276*
5CCA	40 / 5	192*	59*	256*	78*	384*	117*	512*	156*	384	117	511*	156*	767*	234*	1023*	312*
	-4 / -20	147	45	196*	60*	293*	89*	391*	119*	292	89	390	119	585*	178*	780*	238*
	-22 / -30	134	41	178	54	267*	82*	357*	109*	266	81	365	108	533*	162*	710*	217*
	-40 / -40	123	38	163	50	245*	75*	328*	100*	245	75	327	100	490*	149*	654*	199*
6CCA	40 / 5	168*	51*	224*	68*	336*	102*	447*	136*	336	102	448*	137*	672*	205*	896*	273*
	-4 / -20	128	39	171*	52*	257*	78*	343*	105*	256	78	342	104	513*	156*	684*	208*
	-22 / -30	117	36	156	48	234*	71*	313*	95*	234	71	312	95	468*	143*	624*	190*
	-40 / -40	108	33	143	44	215*	66*	287*	88*	215	66	287	87	430*	131*	574*	175*
8CCA	40 / 5	134	41	179*	54*	269*	82*	357*	109*	269	82	358*	109*	537*	164*	716*	218*
	-4 / -20	103	31	137	42	206*	63*	274*	84*	206	63	274	84	411*	125*	548*	167*
	-22 / -30	94	29	125	38	188*	57*	251*	77*	188	57	251	76	376*	115*	502*	153*
	-40 / -40	86	26	115	35	173*	53*	229*	70*	173	53	231	70	346*	105	461*	141*

see example below

* These lengths exceed the maximum segment length and require more than one segment per breaker.

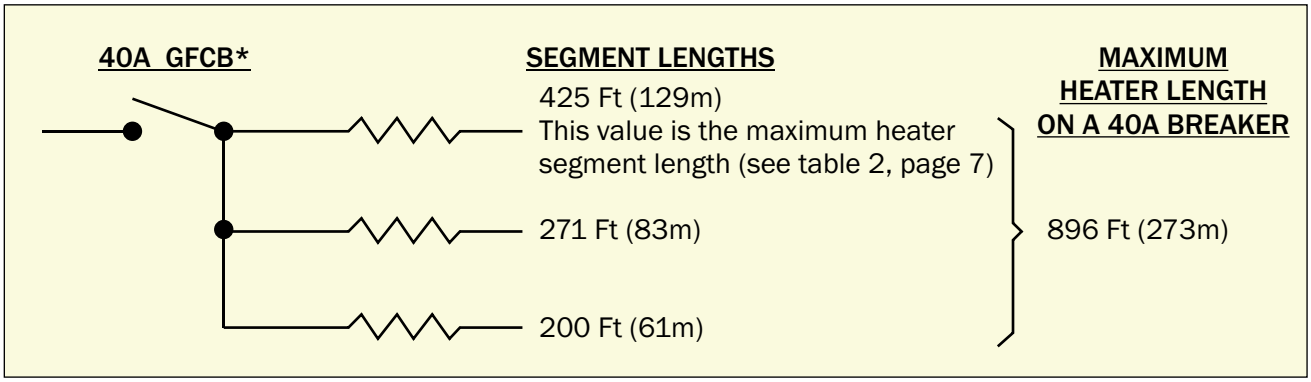
**** For 208, 220, 277 Volt applications, please contact SBA**

SEGMENT LENGTH = Length of the heater cable from a power connection point to the end seal.

MAXIMUM HEATER LENGTH PER BREAKER = Sum of all heater segment lengths.

See diagram below.

EXAMPLE: From TABLE 3 the maximum heater length of the 6CCA-2BA at a start up temperature of 40°F (5°C) is 896 feet. A typical installation to meet this number is as follows:



***CAUTION:** To minimize the danger of a wet wire fire (arcing fault) if the heating cable is damaged or improperly installed, both the Canadian and the National Electrical Code (NEC 1996) require the use of a ground fault protection device (GFPD) at all times in conjunction with the installation of heat tracers.

COMPONENTS:

PST-PX Power connection kit including standoff bracket, molded silicone rubber termination seal kit (MSPS) and end seal kit (MSES), and grommet.
X = Grommet type as follows: **J** = Standard single entry (one segment)
U = Universal for dual entry (two segments)

PST-PJXY Power kit as above but with junction box, terminal block, and pipe straps.
Y = Pipe Straps as follows: 3 for 3in (75mm) pipes and less
12 for 3in to 12in (75mm to 300mm) pipes
20 for 12in to 20in (300mm to 500mm) pipes

PST-SJXY Splice with junction box for easy access.

GRK-S Heat shrink splice for under insulation (package of 5).

GRK-S-1 Heat shrink splice for under insulation (package of 1).

PST-TJXY T-splice with junction box for easy access.

MSES Molded Silicone End Seal. The required quantity is included in each PST kit. However they are sometimes used to temporarily seal the ends of the cable to prevent water ingress while awaiting the final connection (Pack of 5). They are also sold in single packs (MSES-1).

GT-60 Fibreglass tape 60ft (18m), with requirements established as follows:

Pipe size in inches/mm	< 2 (50)	3 (75)	4 (100)	6 (150)	8 (200)	10 (250)
Ft (m) of pipe per roll of GT	60 (20)	50 (15)	40 (12)	25 (7)	20 (6)	15 (5)

GT-180 Fibreglass tape 180ft (55m).

AT-150 Aluminum tape, 2in x 150ft (50mm x 45m) for plastic pipes.

ETL-E Electric trace label - one label every 10ft (3m) is recommended.

TLE-3120-1P Adjustable SPST thermostat, 32-120°F, (0-50°C) with bulb and 10ft (3m) capillary, in a NEMA 3 enclosure.

TLE-4X40 Non adjustable SPST thermostat set at 40°F, (5°C) with bulb and 30in (.75m) capillary, in a NEMA 4X enclosure.

INSTALLATION:

Please verify the complete heater cable installation manual #HT213-latest edition supplied with the cable or available from your distributor. You can also verify our web site at www.baril.ca or contact SBA for any assistance.

SCRAP PREVENTION:

The power connection box can be located along the pipe to allow the use of smaller lengths of cable going in two directions for scrap prevention as shown below.