

Raychem RTB tubing bundles utilizing electric tracing are designed to maintain freeze protection, close temperature tolerances, or viscosity control.

They provide an excellent means of maintaining very long, continuous lengths of impulse lines and piping at consistent temperatures end-to-end.

These bundles are used when the maintain temperature ranges from 10°C (50°F) to 121°C (250°F). Utilizing Raychem self-regulating heater technology, this system will lower its heat output as the process tube gets warmer. Optional line sensing controllers allow for close temperature control, if necessary.

Raychem Electric Heating Cable

RTB Electric Traced tubing bundles utilize Raychem self-regulating technology.

Low temperature maintain and exposure temperature applications are fabricated using Raychem BTV product, while high

temperature maintain and exposure utilize Raychem XTV product.

High temperature XTV Self-Regulating heating cable:

1. Withstands 215°C (420°F) intermittent blowdown temperatures.
2. Maintains temperatures up to 120°C (250°F).

BTV Self-Regulating heating cable:

1. Withstands up to 85°C (185°F) blowdown temperatures.
2. Maintains temperatures up to 65°C (150°F).

The choice between high and low temperature heating cable must be made based on the desired performance and the conditions of the application.

Refer to the appropriate heating cable data sheet for specific heater specifications.

Typical Performance

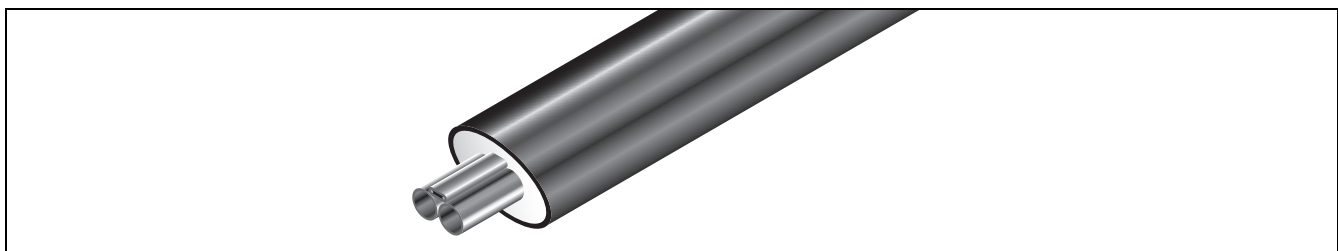
The graphs beginning on page 16 show typical performance splitting summer/winter ambient conditions. Each line is separated at 16°C (60°F) to designate the seasonal differences.

Winter ambients, below 16°C (60°F), assume a 40 km/h (25 mph) wind and summer ambients, above 16°C (60°F), assume a 16 km/h (10 mph) wind. For freeze protection, use 10°C (50°F) as the minimum allowable process tube temperature. This will provide a sufficient factor of safety.

The information presented represents typical performance data for the conditions given and at the rated voltage.

Actual results may vary with the conditions of installation.

For critical applications, consult the factory for specific performance data.



Material Specifications

RTB standard jacket material, TPU, is a thermoplastic polyurethane jacket that offers excellent abrasion resistance and extreme cold temperature workability. TPU also contains no chlorides, so it should be selected for applications where chloride stress cracking is a problem.

Optional Arctic PVC is a proprietary thermoplastic formulation that exceeds the requirements of 105°C PVC and outperforms other PVC jacket materials in UV resistance, as well as providing low temperature flexibility to -35°C (30°F).

	Standard 105°C PVC	Arctic PVC	TPU
Abrasion resistance	G	G	E
Tensile strength PSI	18-1900	2200	3800
Elongation %	250%	350%	700%
Hardness, Shore A	85-90	80	80

E = Excellent G = Good F = Fair P = Poor

Material Specifications (Continued)

RTB standard jacket material, TPU, is a thermoplastic polyurethane jacket that offers excellent abrasion resistance and extreme cold temperature workability. TPU also contains no chlorides, so it should be selected for applications where chloride stress cracking is a problem.

Optional Arctic PVC is a proprietary thermoplastic formulation that exceeds the requirements of 105°C PVC and outperforms other PVC jacket materials in UV resistance, as well as providing low temperature flexibility to -35°C (30°F).

	Standard 105°C PVC	Arctic PVC	TPU
Minimum service temperature	None stated	-35°C (-30°F)	-58°C (-67°F)
Minimum installation temperature	-9°C (15°F)	-23°C (-10°F)	-40°C (-40°F)
UL94 flame	V2	V2	V0 to V2
Halogenated (chlorides)	Yes	Yes	No
Maximum temperature	105°C (220°F)	105°C (220°F)	120°C (250°F)
Water absorption %	0.1%	0.1%	1.2-1.4%
Aromatic hydrocarbons	F	F	G
Weathering	G	G	E
UV resistance	F	G	E
Insulation	Fibrous glass Water soluble chlorides less than 100 ppm Nonhygroscopic		
E = Excellent G = Good F = Fair P = Poor			

Temperature Limits

Maximum process temperature	204°C (400°F)
Maximum jacket surface temperature	60°C (140°F) at ambient temperature of 27°C (80°F) with 10 mph (16 km/h) wind

Tubing Specifications

Designation	Material	Construction	O.D. (mm)	Wall (mm)	Maximum pressure* (Bar)	Maximum continuous length possible ** (m)	Specifications
Metric							
-6-S-10-	316/316L SS	Seamless	6	1	460	300	A269, A213-EAW, DIN 17458 1.4401/1.4404
-8-S-10-	316/316L SS	Seamless	8	1	330	210	A269, A213-EAW, DIN 17458 1.4401/1.4404
-10-S-10-	316/316L SS	Seamless	10	1	260	165	A269, A213-EAW, DIN 17458 1.4401/1.4404
-12-S-10-	316/316L SS	Seamless	12	1	210	150	A269, A213-EAW, DIN 17458 1.4401/1.4404
-10-S-15-	316/316L SS	Seamless	10	1.5	410	150	A269, A213-EAW, DIN 17458 1.4401/1.4404
-12-S-15-	316/316L SS	Seamless	12	1.5	330	120	A269, A213-EAW, DIN 17458 1.4401/1.4404
-12-W-10-	316/316L SS	Welded	12	1	170	300	ASTM, A269
-6-C-10-	Copper	Seamless	6	1	95	600	B68, B75
-8-C-10-	Copper	Seamless	8	1	60	455	B68, B75
-12-C-10-	Copper	Seamless	12	1	55	300	B68, B75
-6-P-10-	PFA Teflon	Extruded	6	1	10	300	
-8-P-10-	PFA Teflon	Extruded	8	1	8	300	
-10-P-10-	PFA Teflon	Extruded	10	1	7	300	
-12-P-10-	PFA Teflon	Extruded	12	1	4	300	
Fractional							
-1/8-S-.035-	316/316L SS	Seamless	1/8	0.035	10,900	900	A269, A213-EAW

Tubing Specifications (Continued)

Designation	Material	Construction	O.D. (mm)	Wall (mm)	Maximum pressure* (Bar)	Maximum continuous length possible ** (m)	Specifications
-1/4-S-.035-	316/316L SS	Seamless	1/4	0.035	5,100	1,000	A269, A213-EAW
-3/8-S-.035-	316/316L SS	Seamless	3/8	0.035	3,300	1,200	A269, A213-EAW
-1/2-S-.035-	316/316L SS	Seamless	1/2	0.035	2,600	700	A269, A213-EAW
-3/8-S-.049-	316/316L SS	Seamless	3/8	0.049	4,800	500	A269, A213-EAW
-1/2-S-.049-	316/316L SS	Seamless	1/2	0.049	3,700	460	A269, A213-EAW
-1/2-S-.065-	316/316L SS	Seamless	1/2	0.065	5,100	250	A269, A213-EAW
-1/4-W-.035-	316/316L SS	Welded	1/4	0.035	4,080	1,000	A269
-3/8-W-.035-	316/316L SS	Welded	3/8	0.035	2,640	1,000	A269
-1/2-W-.035-	316/316L SS	Welded	1/2	0.035	2,080	700	A269
-1/4-C-.030-	Copper	Seamless	1/4	0.030	1,400	1,000	B68, B75
-3/8-C-.032-	Copper	Seamless	3/8	0.032	900	1,500	B68, B75
-1/2-C-.035-	Copper	Seamless	1/2	0.035	800	1,000	B68, B75
-1/2-C-.049-	Copper	Seamless	1/2	0.049	1,100	500	B68, B75
-1/4-P-.030-	PFA Teflon	Extruded	1/4	0.030	155	1,000	
-3/8-P-.030-	PFA Teflon	Extruded	3/8	0.030	95	1,000	
-1/4-M-.035-	Monel	Seamless	1/4	0.035	4,800	1,000	B163, B165
-3/8-M-.035-	Monel	Seamless	3/8	0.035	3,100	600	B163, B165
-1/4-M-.049-	Monel	Seamless	1/2	0.049	3,210	600	B163, B165
-1/2-P-.062-	PFA Teflon	Extruded	1/2	0.062	155	1,000	

Pressure Correction for Elevated Temperatures

	PFA Teflon	Copper	316SS	Monel
93°C (200°F)	0.84	0.80	1.00	0.88
204°C (400°F)	0.30	0.50	0.95	0.79
316°C (600°F)	–	–	0.82	0.79
427°C (800°F)	–	–	0.79	0.76

Raychem Electric Heating Cable Data: Nominal Power Output at 10°C (50°F)

Code	V	W/ft	W/m	Max. continuous exposure* and maintain	Max. intermittent exposure**	T-rating	Raychem heating cable	Approvals***
5B1	120	5	16	65°C (150°F)	85°C (185°F)	T6	5BTV1-CT	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T6; CL I, ZN 1, AEx e II T6 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T6 Ex e II T6 Baseefa: Baseefa06ATEX0183X [Ex] II 2 GD Ex e II T6 Ex tD A21 IP66
8B1	120	8	26	65°C (150°F)	85°C (185°F)	T6	8BTV1-CT	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T6; CL I, ZN 1, AEx e II T6 CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T6 Ex e II T6 Baseefa: Baseefa06ATEX0183X [Ex] II 2 GD Ex e II T6 Ex tD A21 IP66
10B1	120	10	33	65°C (150°F)	85°C (185°F)	T6	10BTV1-CT	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T6; CL I, ZN 1, AEx e II T6 CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T6 Ex e II T6 Baseefa: Baseefa06ATEX0183X [Ex] II 2 GD Ex e II T6 Ex tD A21 IP66
5B2	240	5	16	65°C (150°F)	85°C (185°F)	T6	5BTV2-CT	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T6; CL I, ZN 1, AEx e II T6 CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T6 Ex e II T6 Baseefa: Baseefa06ATEX0183X [Ex] II 2 GD Ex e II T6 Ex tD A21 IP66

Raychem Electric Heating Cable Data: Nominal Power Output at 10°C (50°F)

Code	V	W/ft	W/m	Max. continuous exposure* and maintain	Max. intermittent exposure**	T-rating	Raychem heating cable	Approvals***
8B2	240	8	26	65°C (150°F)	85°C (185°F)	T6	8BTV2-CT	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T6; CL I, ZN 1, AEx e II T6 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T6 Ex e II T6 Baseefa: Baseefa06ATEX0183X [Ex] II 2 GD Ex e II T6 Ex tD A21 IP66
10B2	240	10	33	65°C (150°F)	85°C (185°F)	T6	10BTV2-CT	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T6; CL I, ZN 1, AEx e II T6 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T6 Ex e II T6 Baseefa: Baseefa06ATEX0183X [Ex] II 2 GD Ex e II T6 Ex tD A21 IP66
5X1	120	5	-	120°C (250°F)	215°C (420°F)	T3	5XTV1-CT-T3	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66
10X1	120	10	-	120°C (250°F)	215°C (420°F)	T3	10XTV1-CT-T3	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66
15X1	120	15	-	120°C (250°F)	215°C (420°F)	T2D	15XTV1-CT-T2	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66
20X1	120	20	-	120°C (250°F)	215°C (420°F)	T2C	20XTV1-CT-T2	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66
5X2	240	5	-	120°C (250°F)	215°C (420°F)	T3	5XTV2-CT-T3	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66
10X2	240	10	-	120°C (250°F)	215°C (420°F)	T3	10XTV2-CT-T3	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66
15X2	240	15	49	120°C (250°F)	215°C (420°F)	T3	15XTV2-CT-T3	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66
20X2	240	20	66	120°C (250°F)	215°C (420°F)	T2	20XTV2-CT-T2	FM: CL I, Div. 2, Grps. B,C,D; CL II, Div. 2, Grps. F, G; CL III; T3, T2D, T2C CL I, ZN 1, AEx e II T3/T2 CSA: CL I, Div. 1 & 2, Grps. A,B,C,D; CL II, Div. 1 & 2, Grps. E, F,G; CL III; T3, T2D, T2C Ex e II T3/T2 Baseefa: Baseefa06ATEX0184X [Ex] II 2 GD Ex e II T* (See Schedule) Ex tD A21 IP66

* Continuous power on/off

** 1,000 hours cumulative power on or off

*** Approvals – For specific approval information, refer to the *Tubing Bundles Selection and Installation Guide* (H5626) and the *Design Guide for Tubing Bundles* (H56886).

Dimensions

	Nominal weight		Nominal dimensions			
	kg/m	(lb/ft)	A cm	(in)	B cm	(in)
Single 1/4" process tube	0.45	(0.3)	2.8	(1.1)	2.5	(1.0)
Single 3/8" process tube	0.60	(0.4)	3.3	(1.3)	2.5	(1.0)
Single 1/2" process tube	0.74	(0.5)	3.6	(1.4)	2.8	(1.1)
Dual 1/4" process tubes	0.60	(0.4)	3.3	(1.3)	2.8	(1.1)
Dual 3/8" process tubes	0.89	(0.6)	3.8	(1.5)	3.0	(1.2)
Dual 1/2" process tubes	1.19	(0.8)	4.3	(1.7)	3.6	(1.4)

Minimum bending radius 20 cm (8 in)

Maximum support centers-ft. Horizontal 2 m (6 ft) Vertical 4 m (15 ft)

Maximum Circuit Length vs. Circuit Breaker Rating: 120 Vac

	Start-up temp.		15 A		20 A		30 A		40 A		50 A	
	°C	°F	m	ft	m	ft	m	ft	m	ft	m	ft
5XTV1-CT-T3	10	50	55	180	73	240	110	360	117	385	117	385
	-18	0	49	160	64	210	98	320	117	385	117	385
	-29	-20	46	150	61	200	93	305	117	385	117	385
	-40	-40	44	145	59	195	88	290	117	385	117	385
10XTV1-CT-T3	10	50	34	110	44	145	67	220	82	270	82	270
	-18	0	29	95	40	130	59	195	79	260	82	270
	-29	-20	29	95	38	125	58	190	76	250	82	270
	-40	-40	27	90	37	120	55	180	73	240	82	270
15XTV1-CT-T2	10	50	23	75	30	100	46	150	61	200	67	220
	-18	0	20	65	27	90	41	135	55	180	67	220
	-29	-20	20	65	26	85	40	130	52	170	66	215
	-40	-40	18	60	24	80	38	125	50	165	62	205
20XTV1-CT-T2	10	50	15	50	2	6	37	120	49	160	58	190
	-18	0	15	50	21	70	32	105	43	140	55	180
	-29	-20	15	50	20	65	32	105	43	140	52	170
	-40	-40	15	50	20	65	30	100	40	130	50	165
5BTV1-CT	10	50	70	230	82	270	82	270	82	270	-	-
	-18	0	43	140	58	190	82	270	82	270	-	-
	-29	-20	38	125	50	165	76	250	82	270	-	-
	-40	-40	34	110	44	145	67	220	82	270	-	-
8BTV1-CT	10	50	46	150	61	200	64	210	64	210	-	-
	-18	0	30	100	40	130	61	200	64	210	-	-
	-29	-20	26	85	35	115	53	175	64	210	-	-
	-40	-40	24	80	32	105	47	155	64	210	-	-
10BTV1-CT	10	50	37	120	49	160	55	180	55	180	-	-
	-18	0	24	80	34	110	49	160	55	180	-	-
	-29	-20	21	70	29	95	43	140	55	180	-	-
	-40	-40	20	65	26	85	38	125	52	170	-	-

Typical Performance

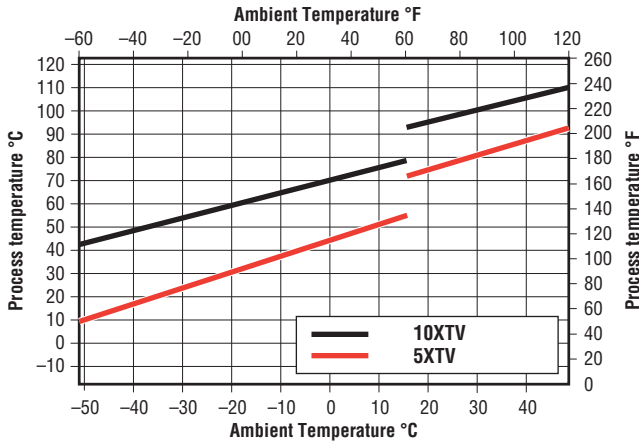
The information presented represents typical performance data for the conditions given and at the rated voltage. Actual results may vary with the conditions of installation.

For critical applications, consult the factory for specific performance data.

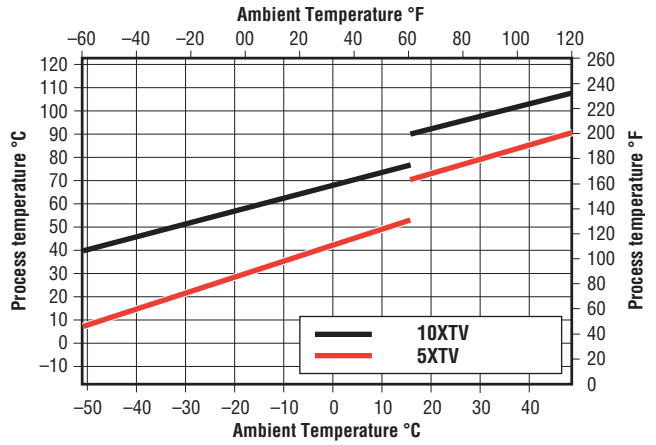
Winter ambients, below 16°C (60°F), assume a 40 km/h (25 mph) wind and summer ambients, above 16°C (60°F), assume a 16 km/h (10 mph) wind. For freeze protection use 10°C (50°F) as the minimum allowable process tube temperature. This will provide sufficient factor of safety.

Typical Performance for High Temperature

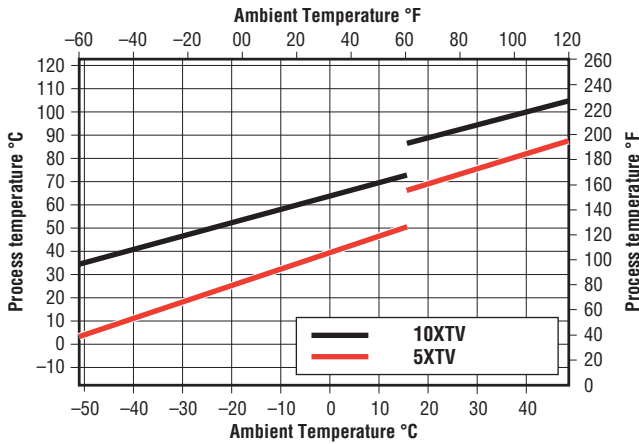
Single 1/4" Process



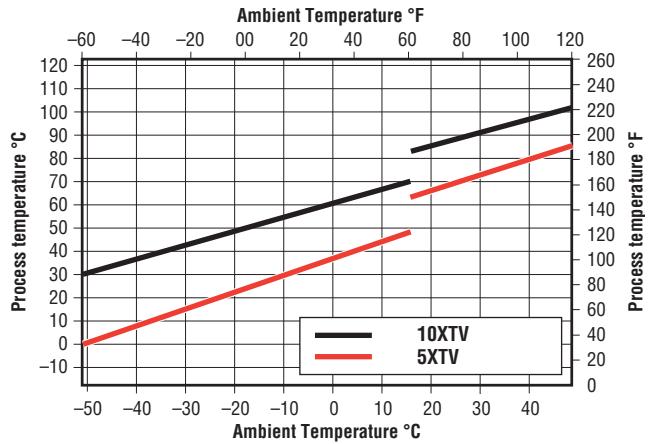
Dual 1/4" Process



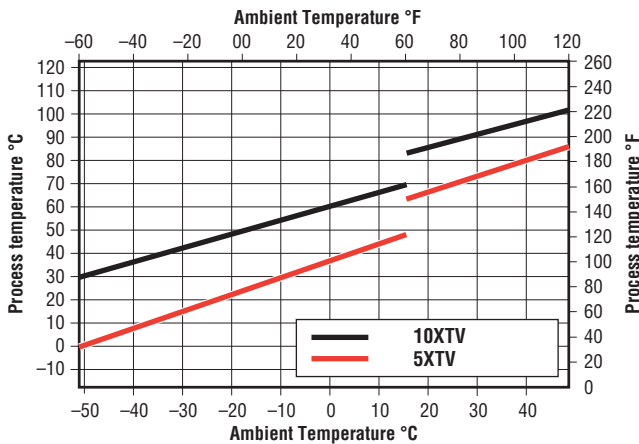
Single 3/8" Process



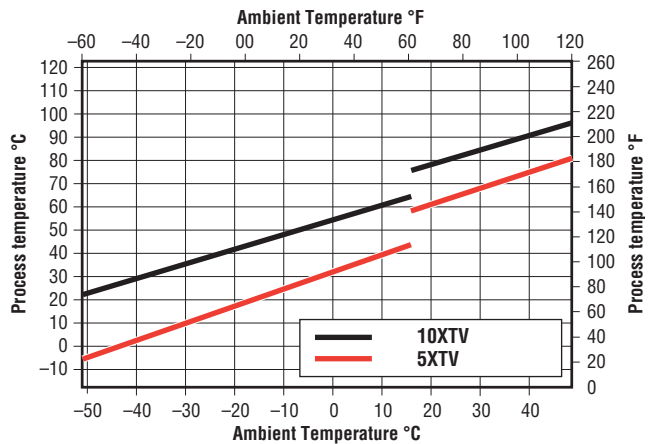
Dual 3/8" Process



Single 1/2" Process

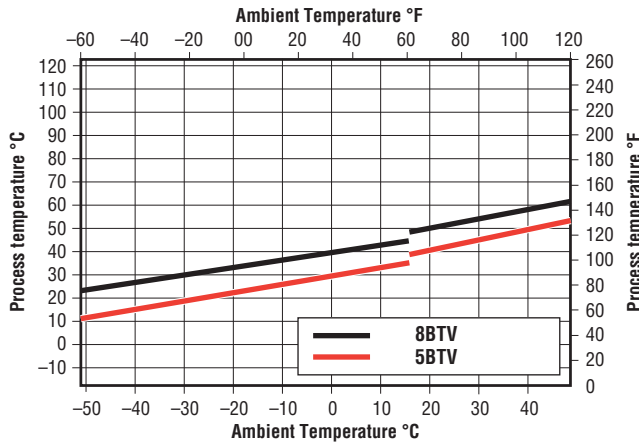


Dual 1/2" Process

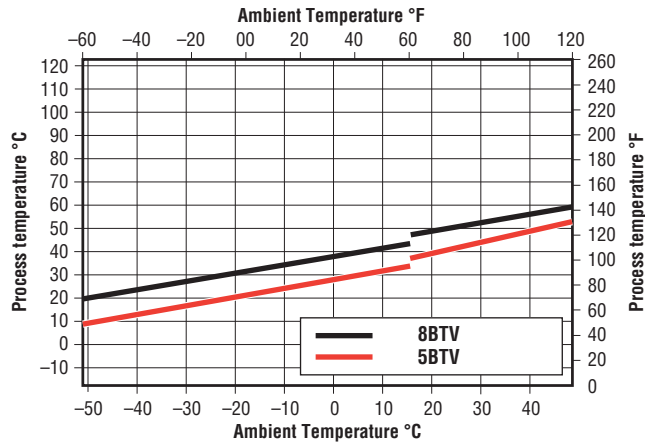


Typical Performance for Freeze Protection

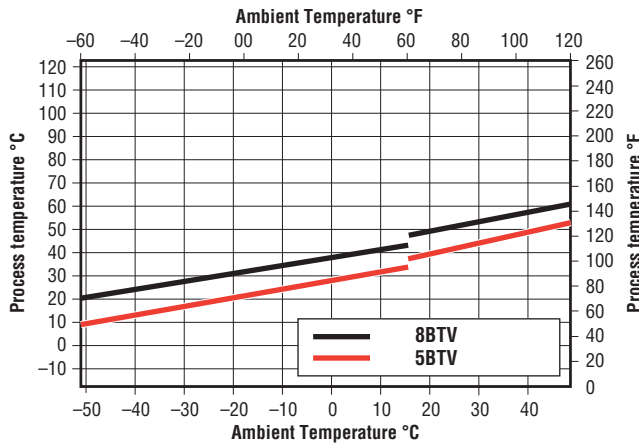
Single 1/4" Process



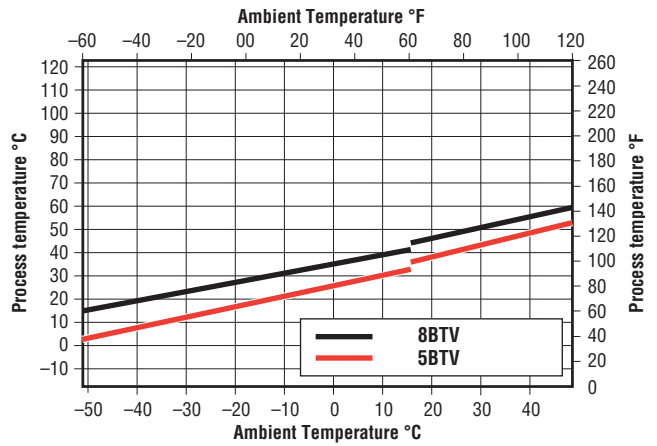
Dual 1/4" Process



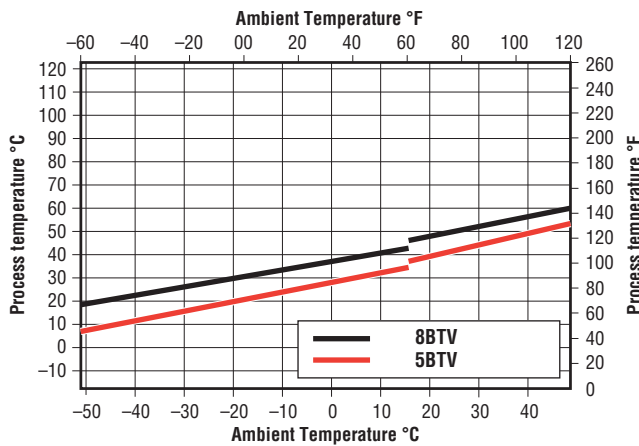
Single 3/8" Process



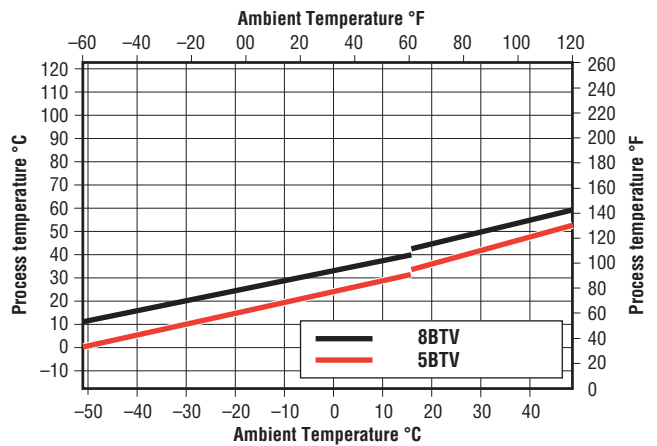
Dual 3/8" Process



Single 1/2" Process



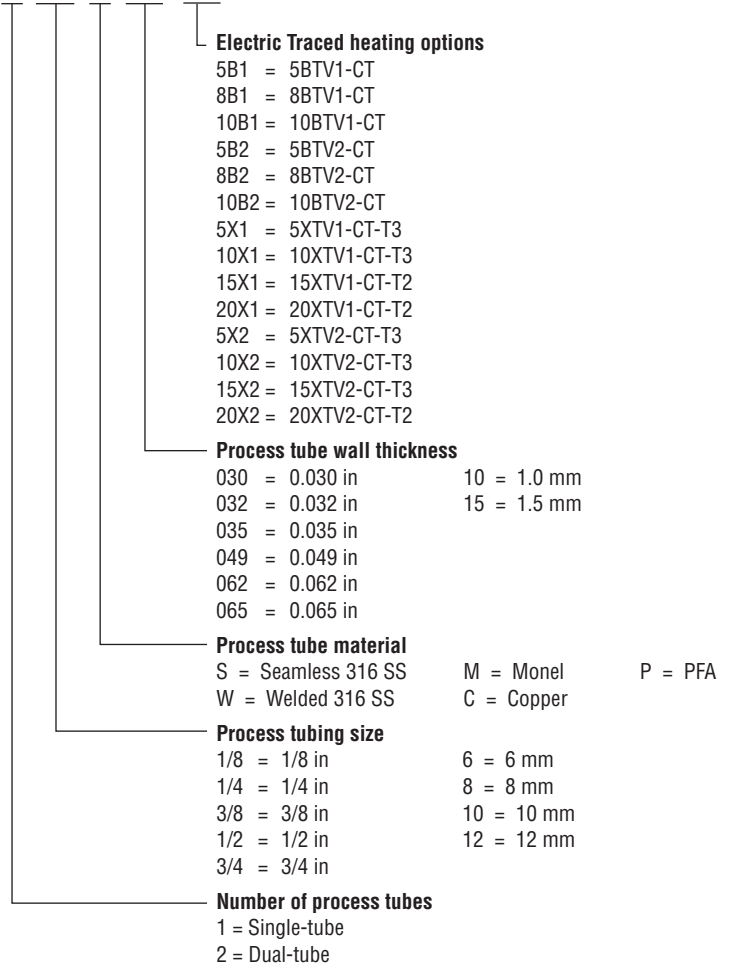
Dual 1/2" Process



Tubing Bundle Ordering Details

RTB comes in a variety of configurations. The following chart outlines the elements that constitute a bundle configuration and the corresponding catalog number. Other configurations are available on request.

RTB* - X - XXX - X - XXX - XXX



* For optional Arctic PVC jacket add suffix "C" example RTBC

Examples:

Electric Traced RTB-2-1/2-S-049-10X1

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