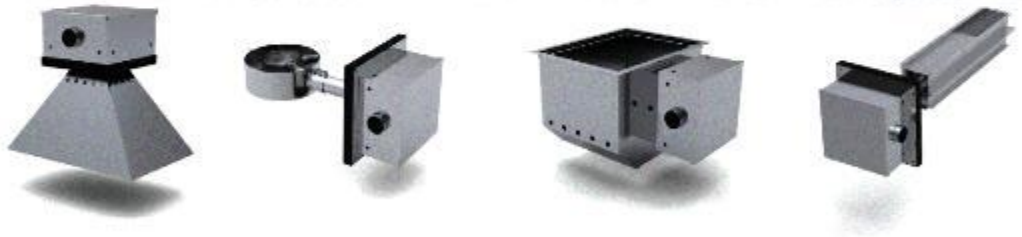
2015 CATALOG

ThermoTech™
CONVEYOR BELT HEATERS



GUARANTEED to be 100% effective in eliminating freezing problems associated with conveyor belts when specified, installed and operated per the manufacturer's recommendations. This patented system is available for virtually any size belt running at any speed.

Heaters for conveyor belts and related components since 1984

Thermo-Tech Inc. 533 William Ave. Davis, WV 26260 1-877-693-7693 or (304) 259-5860 www.BeltHeater.com

ThermoTech™
CONVEYOR BELT HEATERS

History

Thirty-one years of experience goes into every Thermo-Tech conveyor belt heater installation. An effort to replace uncontrolled open flames, ineffective electric heaters, and eliminate the environmental hazards, complications, and expense of antifreeze application, prompted the development of the Thermo-Tech™ conveyor belt heater in 1984. These automated systems for removing frost, ice and moisture from conveyor belts have been operating 24 hours a day 7 days a week throughout the entire winter in mining, quarrying and power generation facilities in the US, Canada, Asia, South America and Mongolia's Gobi Desert where the average minimum temperature is -40° F. They have been totally effective in eliminating the freezing and/or moisture problem for which they are specified. Given our many years of experience and wide range of applications, we can specify the best system for your needs and we guarantee the performance of any heater that we recommend.

Features

- Set it and forget it operation
- Large fuel capacities allow the heater to run for weeks or months without refueling (depending on tank size selected)
- The most economical method of eliminating frost and ice on conveyor belts GUARANTEED
- Adjustable heat output, applies the right amount of heat exactly where it is needed
- Not affected by dust, rain, snow or corrosive atmosphere
- Lifetime stainless steel construction
- MSHA No. 010104 (enclosed)

Benefits

- Totally eliminate downtime due to frost and ice on conveyor belts, drive rolls, idler rolls, clam shell gates, belt scrapers and more. Stop damage to rip detection sensor loops.
- Eliminate labor costs associated with personnel monitoring belt operations during severe weather
- Significant cost savings and none of the environmental issues associated with using antifreeze
- Guaranteed to provide around-the-clock elimination of frost and ice build-up, unlike hit and miss antifreeze systems
- Eliminate the need to enclose conveyors, saving tens or even hundreds of thousands of dollars in construction costs

Principals of Frost and Ice on Conveyor Belts

Frost, ice and moisture accumulation on conveyor belts that inevitably gets transferred to rolls can occur for different reasons, even on the same conveyor belt on the same day. Naturally occurring frost tends to accumulate slowly and can be prevented by continuously applying a small amount of heat to the moving belt anytime this frost formation is likely to occur, usually after the sun sets and during nighttime hours. When snow, rain, freezing rain, sleet, moisture from the material being conveyed or a combination of any of the these adhere to the belt surface, considerably more heat may be required to remove or prevent ice build up. The process of melting the ice also evaporates all or most of the moisture and dries the belt in most cases, which prevents ice build up on rolls. Determining the exact cause of the ice dictates how much heat will be required to do the job and when it is best or most economical to allow the conveyor belt to run continuously with the heater operating. It is possible to remove any amount of ice instantly if enough heat is applied over enough distance or length of belt surface regardless of belt size or speed. However, this instant melting of heavy ice accumulation may not be the most desirable or economical. A careful evaluation of your operating conditions by our experienced personnel can be used to determine the right system for your operation.

ThermoTech™
CONVEYOR BELT HEATERS

Standard and Custom Designs

Thermo-Tech™ offers several standard models to choose from, these units will work for most situations. We also design custom heating systems for applications such as chute and screen freezing and mine ventilation air or other situations that are not suitable for conventional heating equipment.

Standard Models

Model A

Model B

Model C

Model D

Durable

Thermo-Tech's patented conveyor belt heaters are constructed from grade 304 and grade 309 stainless steel. They are sealed dust tight and not affected by the weather including rain, snow, ice or moisture. They are designed to operate in dusty, dirty conditions by utilizing a remote air filtering system that can be located 40 feet or more from the installed unit.

Safe

The safe operation of these heating systems is the most important concern. These units are designed to stop operating any time that the belt even begins to slow down. UL and CSA approved burners and controls used in commercial/residential heating systems assures a safe operating system. The open design does not collect spillage from the underside of the belt and the heaters do not retain heat after they stop. MSHA has tested and evaluated the use of these systems. (Report enclosed.)

Economical

Economical operation is the hallmark of Thermo-Tech™ conveyor belt heaters. They will totally eliminate downtime due to frost and ice build up or accumulation when they are properly specified, installed and operated. This claim is backed by our 100% Satisfaction Guarantee. A typical 56 inch belt running at 500 ft per minute that is experiencing material slide back can be treated with this system using approx. 2 1/2 gallons of diesel fuel or 3 3/4 gallons of propane per hour. Larger belts require more, smaller belts require less. Initial acquisition cost and minimal fuel consumption is typically a fraction of lost revenues due to downtime or labor and consumable costs incurred using alternate methods of deicing.

Dependable

These systems typically will operate throughout the winter without any maintenance. The use of stainless steel in the construction and burners and controls used in time tested home/commercial furnaces, as well as components used in jet aircraft engines make for a lasting and dependable system.

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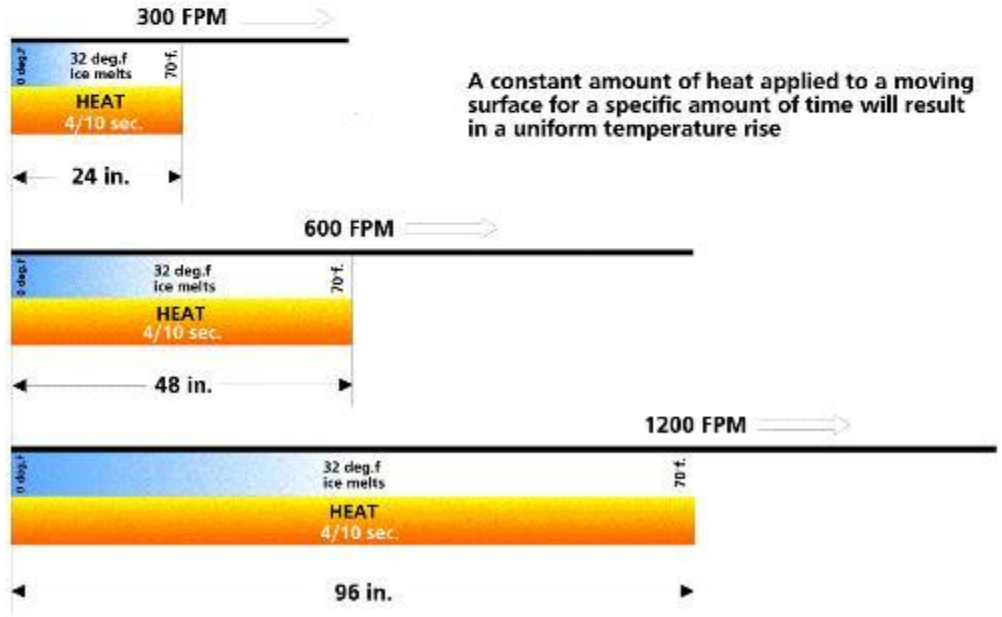
Direct combustion conveyor belt deicing

Ice and frost can be removed from conveyor belts very efficiently by applying a direct flame to the moving belt surface. This concept is comparable to passing your finger through a candle flame. You do not feel the heat of the flame because your finger moves quickly. This concept, on a larger scale, will deice and or dry a conveyor belt very safely as long as the equipment is of a fail-safe design, shutting down *instantly* when the belt movement ceases and located so that escaping heat does not come in contact with anything that may be damaged, and does not retain enough heat after shut down that would be damaging to the belt.

The use of a direct flame to remove frost and ice from conveyor belts has been around as long as conveyor belts have been used in mining in cold climates. Until the invention of the Thermo-Tech™ belt heater, flame application was typically delivered by a salamander, propane weed burner, or some type of open container for holding diesel fuel or kerosene placed under the belt that required constant monitoring by a person. These systems can be dangerous and numerous belt fires have occurred as a result of insufficient monitoring. The Thermo-Tech™ belt heater design utilizes a fail-safe shut down system and components that are UL/CSA certified. MSHA allows the use of these heaters on conveyor belts located above ground. MSHA Investigative Report MRS No. 010104, dated May 2, 1994 (included in the back of this catalog) details installation parameters that must be strictly adhered to.

The principle of applying a direct flame works on small, slow-moving belts as well as the largest belt moving at the fastest speed. This formula is applying the heat over a long enough distance on the moving belt surface to melt the ice or evaporate any moisture present. For example, a belt moving at 300 feet per minute requires the heat be applied over a distance of about 24 inches to melt ice under typical conditions. A belt traveling at 1200 feet per minute requires the heat be applied over a distance of 96 inches to achieve the same result as shown in the illustrations below. The maximum flame temperature is around 1700 deg F/927 deg.C, yet there are absolutely no adverse effects on the conveyor belt from this very brief application of heat.



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CONVEYOR BELT HEATERS

Thermo-Tech conveyor belt heater return on investment

Downtime expenses due to freezing problems with conveyor belt systems can be significant. The initial investment cost for a Thermo-Tech deicing system is not more than a few days of actual labor costs for some operations, let alone lost production costs. The operating costs per hour for the systems are minimal compared to the downtime that they eliminate, as shown in the chart below. Thermo-Tech conveyor belt deicing systems that are properly sized and operated will completely eliminate downtime due to ice problems with conveyor belts. Some customers report that they these systems have paid for themselves many times over in one winter.

Operating Costs

Diesel Fuel vs. Propane

Fuel Oil = 140,000 BTU per gallon Price $ 3.57 gallon
Propane = 93,000 BTU per gallon Price $ 2.25 gallon

	BTU	Fuel Oil		Propane	
		GPH	$/hr.	GPH	$/hr.
Normal range for heating drive rolls and snub rolls, clam shell and sliding gates Deicing belts up to 36" at 350 FPM	42,000	0.30	$ 1.07	0.45	$ 1.01
	56,000	0.40	$ 1.42	0.60	$ 1.35
	70,000	0.50	$ 1.78	0.75	$ 1.68
	84,000	0.60	$ 2.14	0.90	$ 2.02
	98,000	0.70	$ 2.49	1.05	$ 2.36
	112,000	0.80	$ 2.85	1.20	$ 2.70
	126,000	0.90	$ 3.21	1.35	$ 3.03
	140,000	1.00	$ 3.57	1.50	$ 3.37
Deicing belts up to 42" and up to 450 FPM	154,000	1.10	$ 3.92	1.66	$ 3.73
	175,000	1.25	$ 4.46	1.88	$ 4.23
	210,000	1.50	$ 5.35	2.26	$ 5.08
	245,000	1.75	$ 6.24	2.63	$ 5.91
	280,000	2.00	$ 7.14	3.01	$ 6.77
Deicing belts from 42" to 56" up to 500 FPM	315,000	2.25	$ 8.03	3.39	$ 7.62
	350,000	2.50	$ 8.92	3.76	$ 8.46
	385,000	2.74	$ 9.81	4.14	$ 9.31
	420,000	3.00	$ 10.71	4.52	$ 10.17
Deicing belts from 56" to 60" up to 600 FPM	455,000	3.25	$ 11.60	4.89	$ 11.00
	490,000	3.50	$ 12.49	5.27	$ 11.85
	525,000	3.75	$ 13.38	5.65	$ 12.71
	560,000	4.00	$ 14.28	6.02	$ 13.54
Deicing belts from 60" to 84" up to 800 FPM	630,000	4.50	$ 16.06	6.77	$ 15.23
	700,000	5.00	$ 17.85	7.53	$ 16.94
	770,000	5.50	$ 19.63	8.28	$ 18.63
	840,000	6.00	$ 21.42	9.08	$ 20.43
Deicing belts from 60" to 84" up to 1100 FPM	910,000	6.50	$ 23.20	9.78	$ 22.00
	980,000	7.00	$ 24.99	10.53	$ 23.69
	1,050,000	7.50	$ 26.77	11.29	$ 25.40

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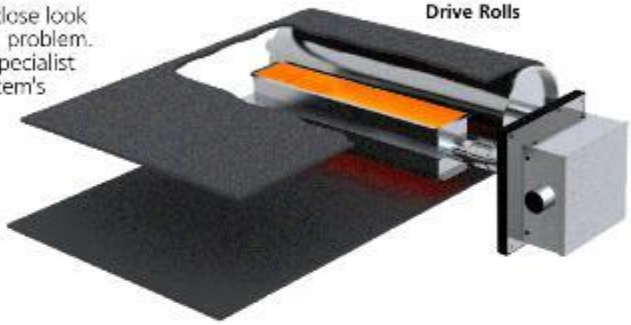
CONVEYOR BELT HEATERS

Eliminating ice on rolls, pulleys and idlers

Frost, ice and material build up on drive rolls, bend pulleys and idlers is easily eliminated with the right amount of heat applied in the right place. The combustion chamber is placed as close to the drive roll or bend pulley as possible, which heats and dries the belt as well as the roll. Ice build up on bottom idlers is often eliminated when a heater is installed to prevent material slideback or a unit can be installed underneath the belt immediately after the material is discharged which will dry the belt and prevent ice from accumulating on the idlers.

Heater Selection

Selecting the proper heater requires a very close look at the actual condition causing the freezing problem. An experienced Thermo-Tech® applications specialist with in-depth knowledge of the heating system's capabilities can specify the proper size and model of heater to correct the problem.

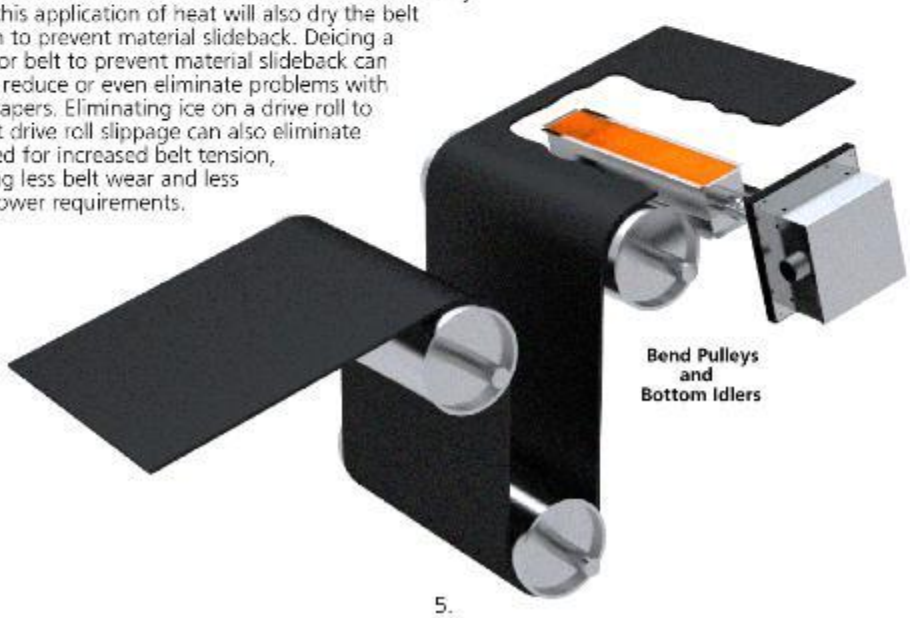


Drive Rolls

Added Benefits

Often a heater that is installed to correct one specific problem will eliminate other problems. For instance, a heater placed adjacent to a bend pulley will almost always eliminate ice on the next pulley as well as the return idlers after that and in many cases, this application of heat will also dry the belt enough to prevent material slideback. Deicing a conveyor belt to prevent material slideback can greatly reduce or even eliminate problems with belt scrapers. Eliminating ice on a drive roll to prevent drive roll slippage can also eliminate the need for increased belt tension, meaning less belt wear and less horsepower requirements.

Model D



Bend Pulleys
and
Bottom Idlers

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Preventing Material Slideback

Frost and ice that accumulates on conveyor belts and can be eliminated with a sufficient amount of heat applied in the right place, no matter how severe the accumulation or how low the temperature drops. Small conveyors require a small amount of heat and large conveyors require much more heat.

Heater Location

The location for the heater depends on available space and size and speed of the belt. When installing a heater to prevent material slideback it is best to place the heater as close to the material pickup point as possible.

Model A

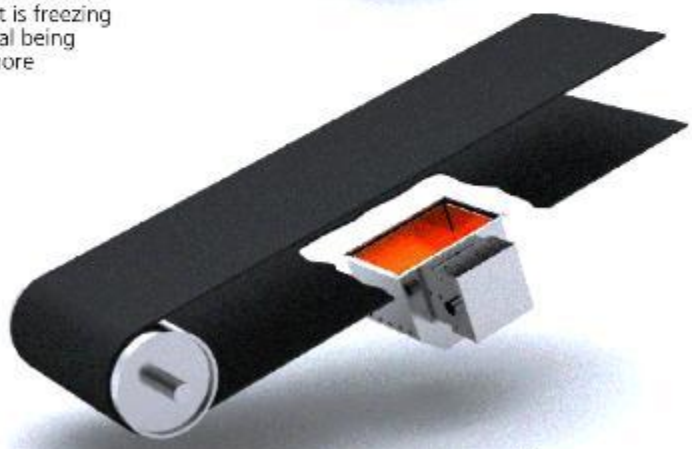
Deicing at Startup

On startup heavy accumulations of frost or ice can be removed using a moderate amount of heat by running the belt with the heater on through several revolutions before loading any material onto it. This is the most economical method of deicing versus applying a large enough amount of heat to remove a heavy accumulation instantly.

Model C

Continuous Operation

Continuous operation of the heater will prevent ice build up regardless of the length of the belt or time in operation. If the moisture that is freezing to the belt is coming from the material being conveyed, it may take considerably more heat than preventing natural frost or ice from accumulating. Heaters are sized accordingly and they feature wide range of adjustment on the heat output to compensate for unforeseen and varying conditions.



Model B

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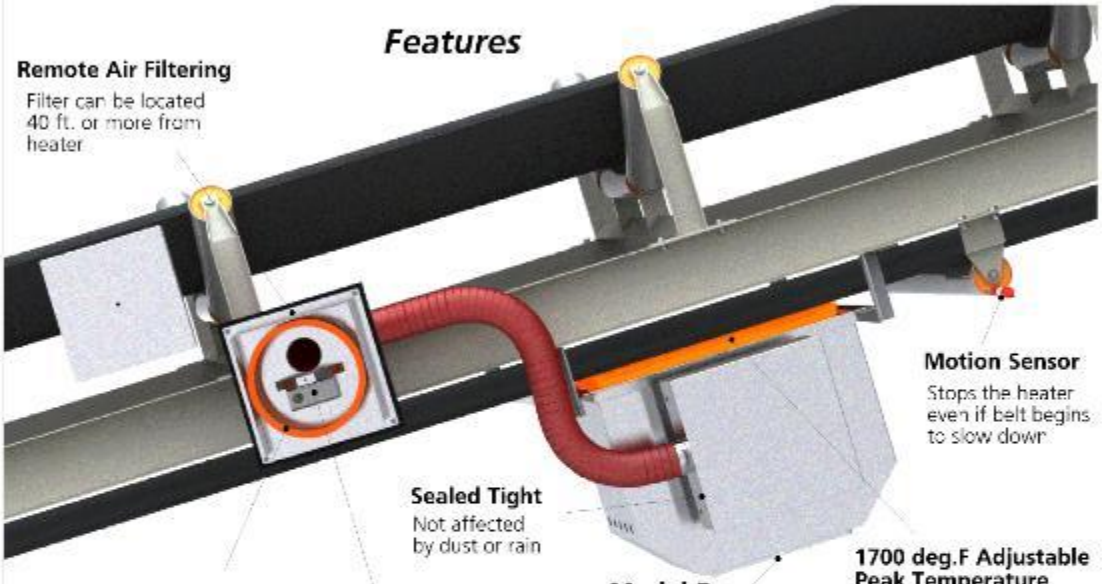
Complete System

There are several standard models of Thermo-Tech™ belt heaters. The available space, belt width and speed and specific icing problem determine the size and style of the system. Basically, the heater consists of a sealed burner unit that is attached to a combustion chamber suspended above or below the belt. The necessary air for combustion is drawn through a flexible tube attached to a remote mounted air filter. The operation of the unit is controlled by a motion sensor and thermostatic control. The Model B unit shown below can be used to eliminate ice or dry virtually any size belt traveling at any speed. The Model A shown is for belts up to 48" @ 450 FPM.

Features



Remote Air Filtering
Filter can be located 40 ft. or more from heater

Motion Sensor
Stops the heater even if belt begins to slow down

Sealed Tight
Not affected by dust or rain

Model B

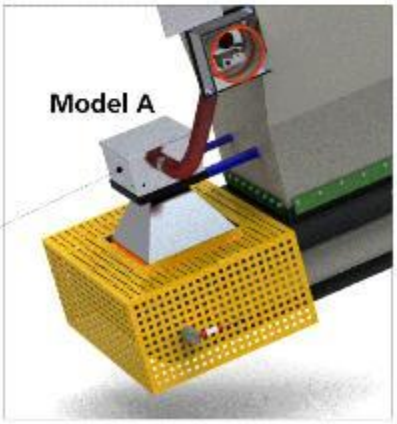
1700 deg.F Adjustable Peak Temperature
Instantly removes frost and ice, however it has no adverse effect on a moving belt

Replaceable Air Filter
Uses economical automotive filters

Thermostat Control
Set it and forget it operation

Open Bottom
Prevents material from accumulating

Stainless Steel Construction
Not affected by spillage, moisture or corrosive conditions



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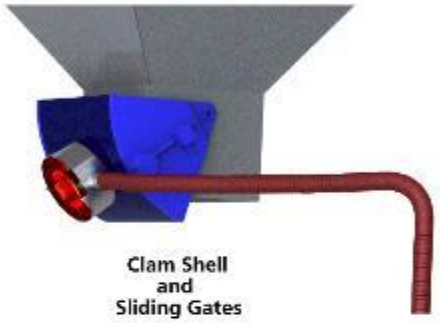
Point Heaters / Remote Applications

If inaccessibility or space restrictions are an issue, the remote option allows combustion chambers to be placed 40 ft. or more from the burner unit. These systems are adaptable to a wide range of applications beyond conveyor belts.

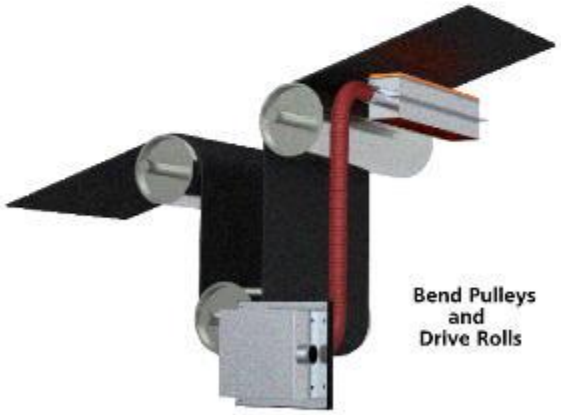
Heat Where You Need It

Scrapers and Inaccessible Areas



Clam Shell and Sliding Gates

The flexible tube carries combustion air, fuel and necessary electrical wiring. This tube can swing freely when the combustion chamber is attached to a clam shell or sliding gate. The open design of the combustion chamber is not affected by water running through it like some installations on clam shells and slide gates.



Bend Pulleys and Drive Rolls

Conveyor Belts

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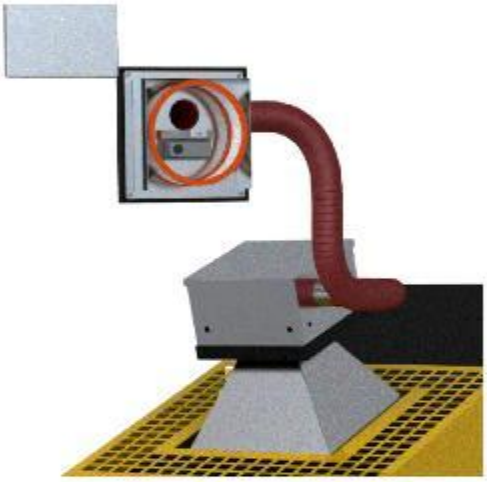
Proven Systems

Thermo-Tech" conveyor belt heaters have been perfected over a period of thirty-one years. These systems are designed to operate in dusty, dirty and wet locations. They are not affected by carry back falling from the belt or water running through them. (They must not be allowed to get buried in spillage.)



Remote Air Filtering

All heaters are equipped with a remote air filtering system that will allow it to operate in extremly dusty conditions. The burner unit is sealed dust tight and the air filter is connected to the burner enclosure with a 4" diameter flexible hose. The system comes equipped with 11 ft. of hose. Additional hose can be connected to locate the air filter 40 ft. or more from the heater if necessary.

Time Tested Components

The UL and CSA approved gun burners used in Thermo-Tech" conveyor belt heaters have been around for over fifty years and have a life expectancy of at least twenty-years. The stainless steel used for the construction will last indefinitely. The special stainless used for the replacable liners in the combustion chambers typically lasts five years.

Stainless Steel Construction

Open Design

Heaters that are installed under the belt feature an open design that prevents spillage from accumulating.
The stainless steel that these units are constructed from will not retain enough heat after shut down to affect the belt.

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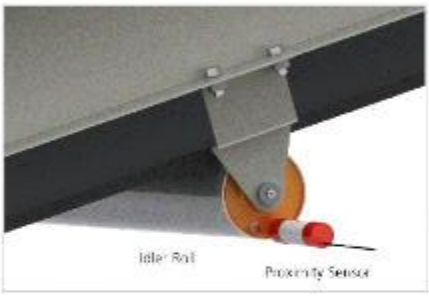
CONVEYOR BELT HEATERS

Automatic Operation

Thermo-Tech™ conveyor belt heaters are designed to operate totally automatically. A motion sensing device and thermostat control the operation of the heater. When the temperature falls below freezing and the belt is in operation the unit starts and runs. If the temperature raises above freezing or the belt stops the heater ceases operation. Refueling intervals depends on the the tank size selected (typically several days or weeks supply). Routine air and fuel filter changes are the only maintenance that is typically required.

Instant Shutdown

Heater operation is controlled by a motion sensing device that stops the heater, even if the belt begins to slow down. A target is welded to the end of an idler or tail roll. A sensor, detects the rotation of the roll, which allows the heater to operate. If there is no rotation the heater stops. A secondary, redundant, shutdown mechanism is incorporated into the shutdown feature to ensure safe operation.



Thermostat Controlled

The thermostat is located inside of the air filter housing which protects it from the elements and prevents unauthorized operation. The thermostat is set to the desired operating temperature. Then if the belt is running and the temperature drops to the setting the heater will come on. If the temperature rises above the setting the heater stops.

Adjustable Heat Output

Heat output is adjustable from 35,000 - 400,000 BTU on small models and 100,000 - 800,000 BTU on larger units. Custom designs feature 1,000,000 plus BTU as required.

Unlimited Fuel Supply

The size of the fuel tank selected determines the time between refueling. Typically a tank is used that will supply the heater with fuel for several days or weeks. Existing tanks can be utilized in many instances.

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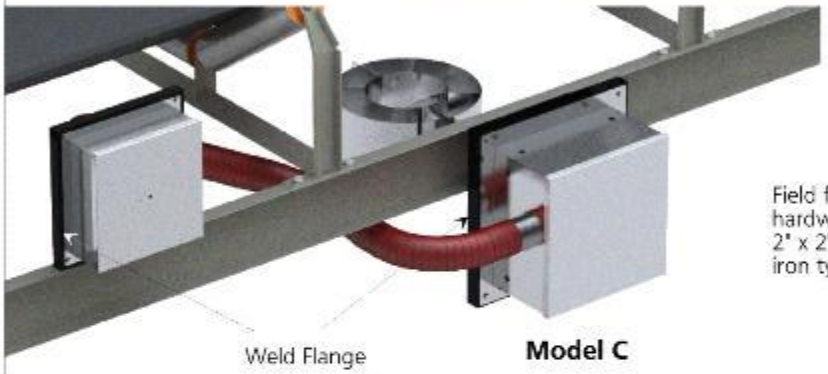
CONVEYOR BELT HEATERS

Installation

Heaters and air filters have mounting flanges that can be welded or bolted to the existing structure or attached with field fabricated brackets. Specialized personnel are not required for most installations. Basic welding and electrical connections can be accomplished by most on site maintenance personnel. We also offer turnkey installations.

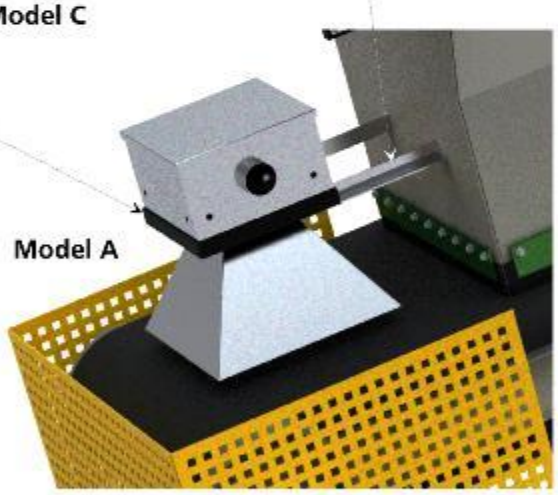


Field fabricated mounting hardware made from 2" x 2" x 1/4" angle iron typical

Weld Flange

Model C

Air filter and heater welded directly to the conveyor structure



Model A

Model A suspended above tail section on conveyor belt

Model B

Model B suspended below belt using 2" x 2" x 1/4 "angle iron welded to 8" channel structure

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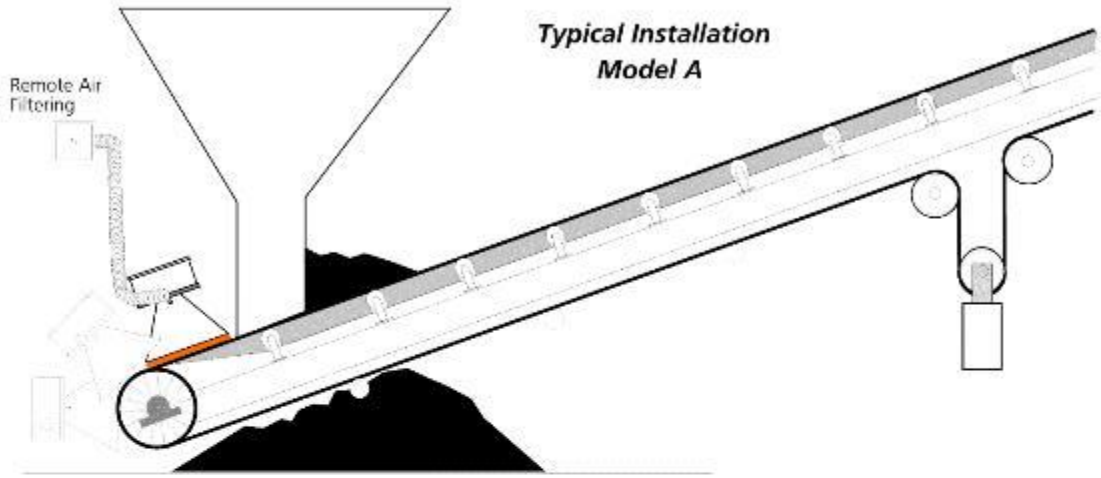
CONVEYOR BELT HEATERS

Material Slideback Model A



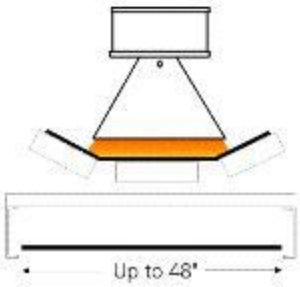
The Model A Heater to eliminate material slideback is for use on belts up to 48" wide and 450 fpm. It can be installed in various positions as illustrated. This model is preferred when space permits. The advantage of using the Model A heater is that it is not subject to spillage that accumulates under the belt. In addition, the material is dumped onto the belt immediately after being deiced, thus requiring less heat and fuel consumption. Available in standard (shown) or remote model.

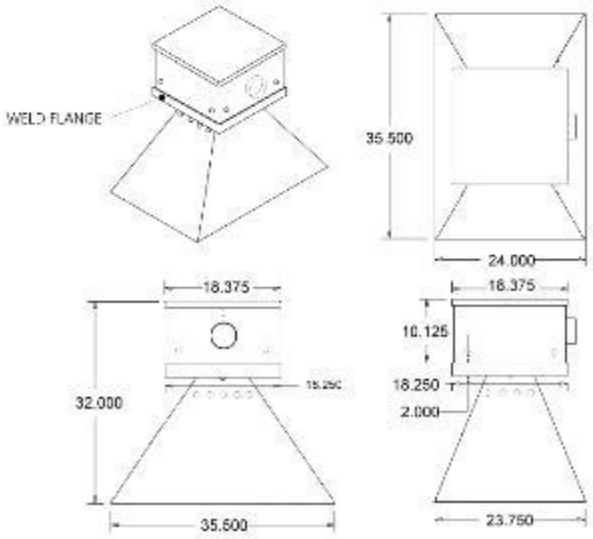
Specifications

Stainless Steel Construction
Remote Air Filtering
Fuel Oil, Propane or Natural Gas

Model A Standard
For belts up to 42" @ 350FPM
50,000 - 125,000 BTU

Model A High Output
For belts up to 48" @ 450 FPM
50,000 - 250,000 BTU





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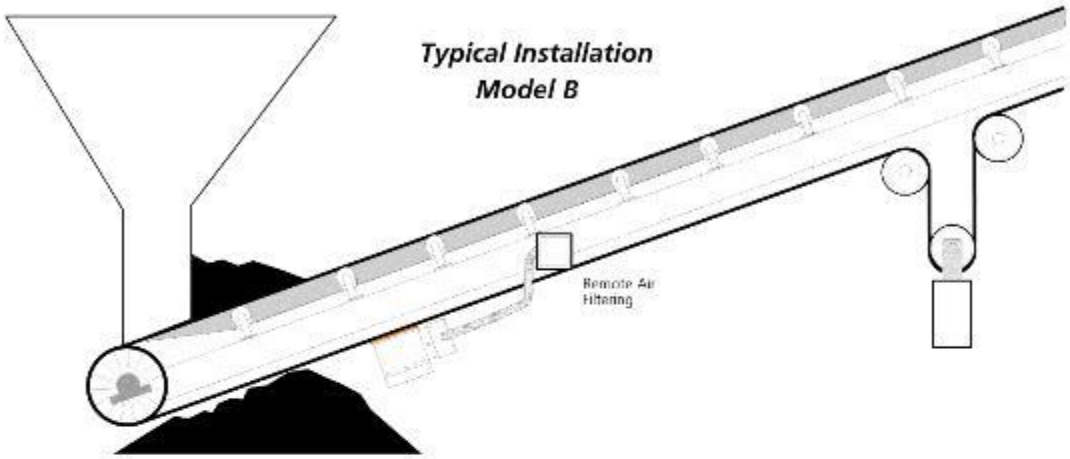
Material Slideback Model B



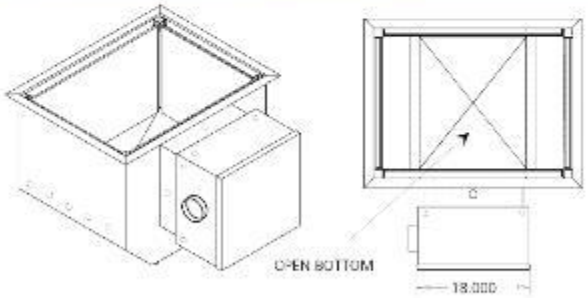
The Model B Heater to eliminate material slideback is available in different sizes for virtually any size belt running at any speed. This heater is installed under the belt as close to the material pickup point as possible. Considerations when selecting this model are - space available and spillage that may accumulate under the belt that may affect the operation of the heater and material being slung off of idler rolls. Available in standared (shown) or remote models.

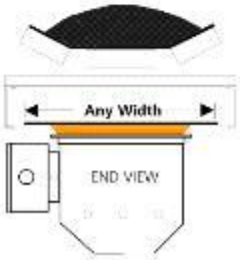
Specifications

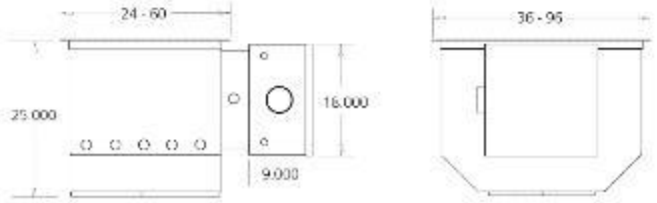
Stainless Steel Construction
Remote Air Filtering
Fuel Oil, Propane or Natural Gas

Model B Standard
Belts Up To 600 FPM
200,000 - 400,000 BTU

Model B High Output
Belts over 600 FPM
400,000 - 800,000 + BTU







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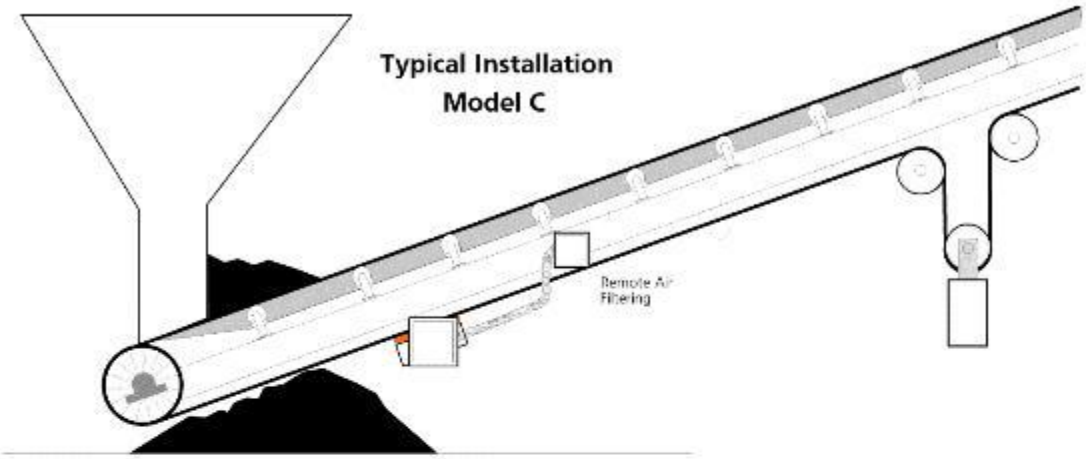
CONVEYOR BELT HEATERS

Material Slideback Model C



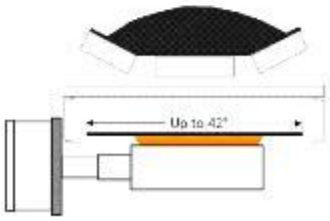
The Model C Heater to eliminate material slideback is for installation on belts up to 350 FPM and up to 42" in width. This heater is installed under the belt as close to the material pickup point as possible. Considerations when selecting this model are spillage that may accumulate under the belt that may affect the operation of the heater, material being slung off of idler roll that may get into the combustion chamber and the enclosure blocking the catwalk. Available in standard (shown) or remote models.

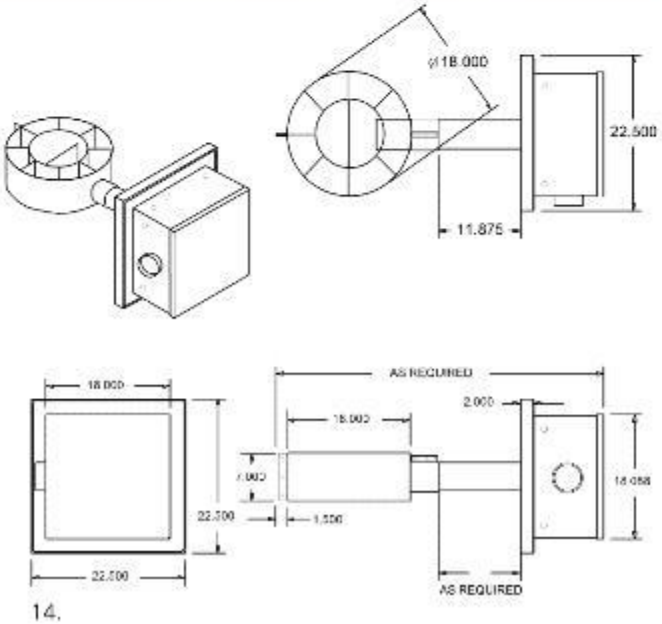
Specifications

Stainless Steel Construction
Remote Air Filtering
Fuel Oil, Propane or Natural Gas

Model C

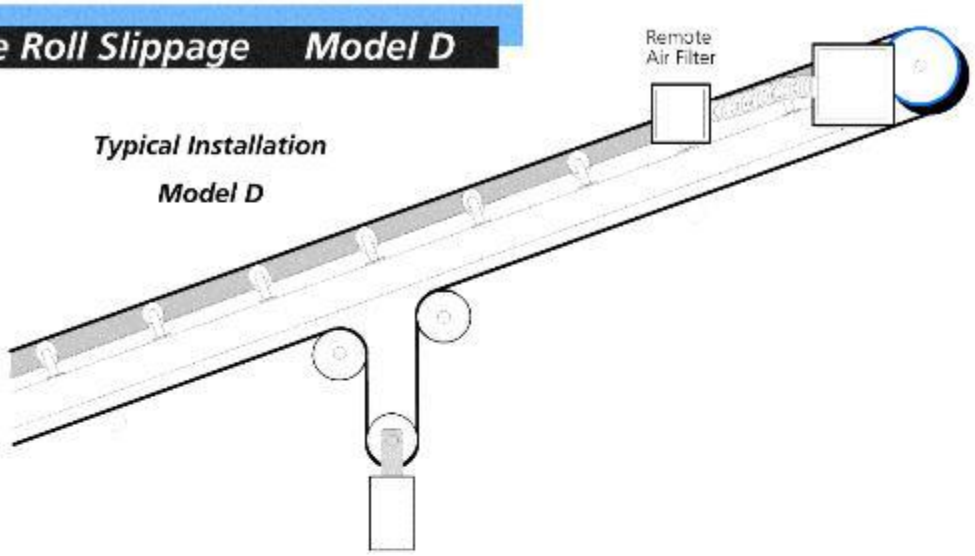
Belts up to 42" @375 FPM
35,000-125,000 BTU





ThermoTech™
CONVEYOR BELT HEATERS

Drive Roll Slippage Model D



Typical Installation

Model D

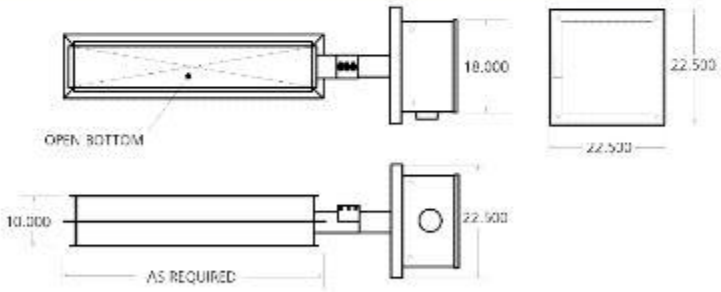
Drive roll slippage due to frost or ice build up on the roll is very easy to treat as long as the combustion chamber can be located close to the drive roll. The combustion chamber is sandwiched between the belt adjacent to the drive roll. In the event that the roll is in an enclosure that contains dust (which could be a fire or explosion hazard), the heater will need to be placed outside of the building. This will require more heat and a larger combustion chamber. Available in standard (shown) or remote models.

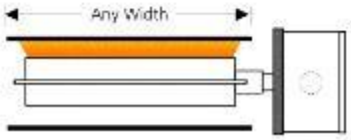
Specifications

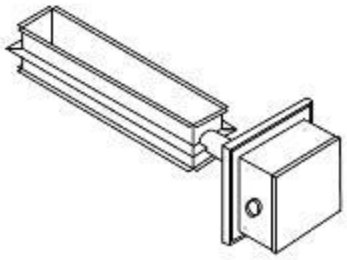
Stainless Steel Construction
Remote Air Filtering
Fuel Oil, Propane or Natural Gas

Model D

Any width belt at any speed
35,000 - 400,000 BTU





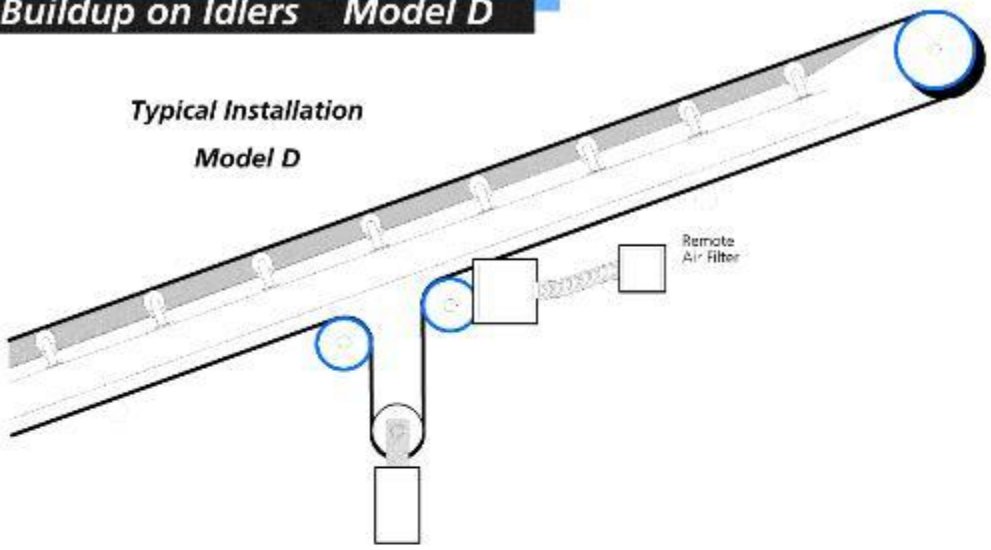


ThermoTech™
CONVEYOR BELT HEATERS

Ice Buildup on Idlers Model D

Typical Installation

Model D



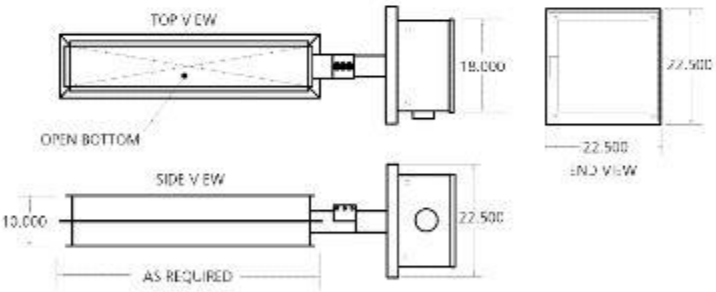
Ice buildup on idler rolls or bend pulleys is easily eliminated with a Model D unit. When installing this model, the combustion chamber is located as close to the roll on the as possible. This setup will prevent ice buildup on both the upper and lower rolls and in some instances will dry the belt enough to prevent material slide back. Available in standard (shown) or remote models.

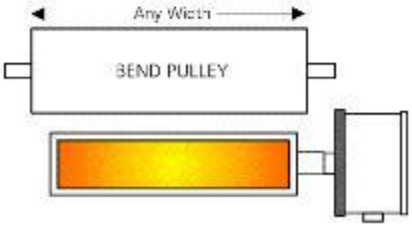
Specifications

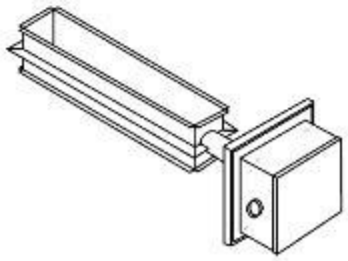
Stainless Steel Construction
Remote Air Filtering
Fuel Oil, Propane or Natural Gas

Model D

Any width belt at any speed
35,000 - 400,000 BTU







Ordering Information

Standard and remote models are depicted on the following pages. Any of these units can be altered to suit your requirements. References to belt speed and width are guidelines to help determine the proper heater and BTU requirements. Conditions can vary significantly due to exposure to wind and temperature extremes. A careful evaluation by Thermo-Tech personnel is the best way to determine the model for your application. Direct fired heaters cannot be installed on belts that go underground. For those applications, the Model MBH indirect fired heater must be used. The best practice is to interlock the heater with the power to the belt drive. This, in addition to the motion sensor provided with the heater, provides a double redundant heater shut down. If it is not practical to power the heater from the belt drive power source, dual motion sensors are provided with the heater.

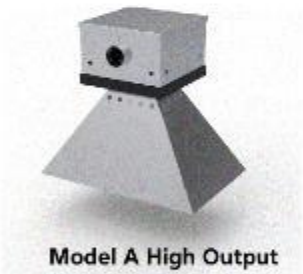
Model A Standard
Belt Width 42 @ 350 FPM

PN A1250F Fuel Oil Fired

35,000 - 125,000 BTU Adjustable
Fuel Consumption .25 - .89 GPH

PN A1250G Propane or Natural Gas

50,000 - 125,000 BTU Adjustable
Propane .54 - 1.34 GPH
Natural Gas 50 - 125 CU FT HR



Model A High Output
Belt Width up to 48" @ 450 FPM

PN A2250F Fuel Oil Fired

35,000 - 200,000 BTU Adjustable
Fuel Consumption .25 - .1.40 GPH

PN A2250G Propane or Natural Gas

50,000 - 200,000 BTU Adjustable
Propane .54 - 2.15 GPH
Natural Gas 50 -200 CU FT HR

Model B Standard
Belt Width up to 60" @ 600 FPM

PN B1400F Fuel Oil Fired

35,000 - 400,000 BTU Adjustable
Fuel Consumption .35 - 2.86 GPH

PN B1400G Propane or Natural Gas

200,000 - 400,000 BTU Adjustable
Propane 2.15 - 4.30 GPH
Natural Gas 35 - 400 CU FT HR

Model B High Output
Belt Width up to 84" @ 1100 FPM

PN B2800F Fuel Oil Fired

70,000 - 800,000 BTU Adjustable
Fuel Consumption .54 - 5.71 GPH

PN B2800G Propane or Natural Gas

400,000 - 800,000 BTU Adjustable
Propane 4.3 - 8.6 GPH
Natural Gas 400 - 800 CU FT HR

Model C Standard
Belt Width up to 42" Speed up to 375 FPM

PN C1125F Fuel Oil Fired

35,000 - 125,000 BTU Adjustable
Fuel Consumption .25 - .89 GPH

PN C1125G Propane or Natural Gas

B50,000 - 125,000 BTU Adjustable
Propane .54 - 1.34 GPH
Natural Gas 50 - 125 CU FT HR

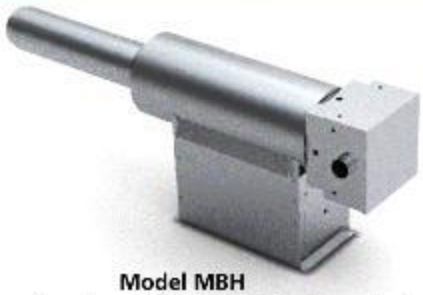
Model D Standard
Belt Width up to 60" @ 800 FPM

PN D1400F Fuel Oil Fired

35,000 - 4000,000 BTU Adjustable
Fuel Consumption .35 - 2.86 GPH

PN D1400G Propane or Natural Gas

50,000 - 400,000 BTU Adjustable
Propane .54 - 4.30 GPH
Natural Gas 50 - 400 CU FT HR



Model MBH
Use where indirect combustion is required

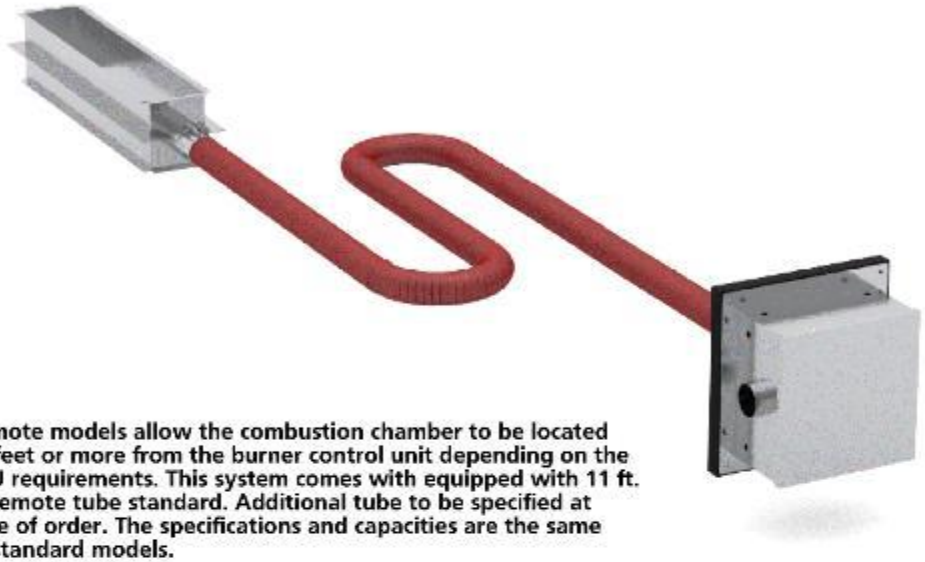
PN MBH1400F Fuel Oil Fired

35,000 - 400,000 BTU Adjustable
Fuel Consumption .35 - 2.86 GPH

PN MBH1400G Propane or Natural Gas

50,000 - 400,000 BTU Adjustable
Propane .54 - 4.30 GPH
Natural Gas 50 - 400 CU FT HR

Remote Applications



Remote models allow the combustion chamber to be located 40 feet or more from the burner control unit depending on the BTU requirements. This system comes with equipped with 11 ft. of remote tube standard. Additional tube to be specified at time of order. The specifications and capacities are the same as standard models.

Model A Standard
Belt Width up to 42"@350 FPM

PN AR1250F Fuel Oil Fired

35,000 - 125,000 BTU Adjustable
Fuel Consumption .25 - .89 GPH

PN AR1250G Propane or Natural Gas

50,000 - 125,000 BTU Adjustable
Propane .54 - 1.34 GPH
Natural Gas 50 - 125 CU FT HR

Model A High Output
Belt Width up to 48" @ 450 FPM

PN AR2250F Fuel Oil Fired

35,000 - 200,000 BTU Adjustable
Fuel Consumption .25 - .1.40 GPH

PN AR2250G Propane or Natural Gas

50,000 - 200,000 BTU Adjustable
Propane .54 - 2.15 GPH
Natural Gas 50 - 200 CU FT HR

Model B Remote Standard
Belt Width up to 60" @ 600 FPM

PN BR1400F Fuel Oil Fired

35,000 - 400,000 BTU Adjustable
Fuel Consumption .35 - 2.86 GPH

PN BR1400G Propane or Natural Gas

200,000 - 400,000 BTU Adjustable
Propane 2.15 - 4.30 GPH
Natural Gas 200 - 400 CU FT HR

Model B Remote High Output
Belt Width up to 84" Speed over 600 FPM

PN BR2800F Fuel Oil Fired

70,000 - 800,000 BTU Adjustable
Fuel Consumption .54 - 5.71 GPH

PN BR2800G Propane or Natural Gas

400,000 - 800,000 BTU Adjustable
Propane 4.3 - 8.6 GPH
Natural Gas 400 - 800 CU FT HR

Model C Remote
Belt Width up to 42" @ 375 FPM

PN CR1125F Fuel Oil Fired

35,000 - 125,000 BTU Adjustable
Fuel Consumption .25 - .89 GPH

PN CR1125G Propane or Natural Gas

50,000 - 125,000 BTU Adjustable
Propane .54 - 1.34 GPH
Natural Gas 50 - 125 CU FT HR

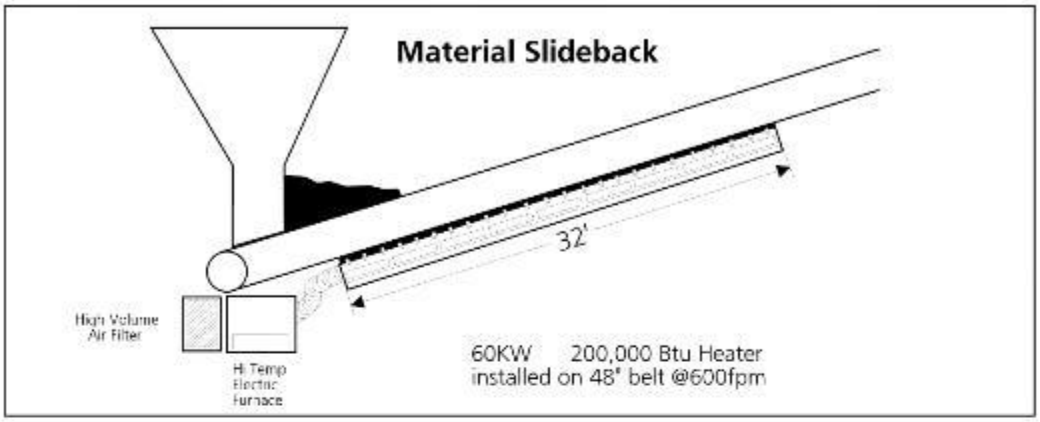
Model D Remote
Belt Width up to 60" @ 800 FPM

PN DR1400F Fuel Oil Fired

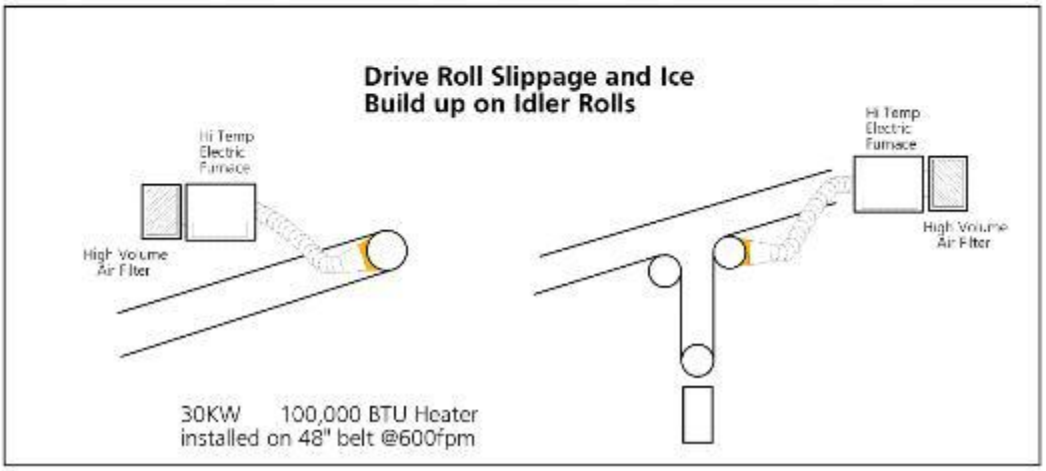
35,000 - 400,000 BTU Adjustable
Fuel Consumption .35 - 2.86 GPH

PN DR1400G Propane or Natural Gas

50,000 - 400,000 BTU Adjustable
Propane .54 - 4.30 GPH
Natural Gas 50 - 400 CU FT HR



Electric heaters are available for some applications. The heat exchanger used to deice the belt is six to ten times longer than a standard fuel fired belt heater. This additional length is required because of the low temperature of the air (approx. 250 deg. compared to 1700 deg. for direct fired). Insulated heat exchangers are custom-designed for each application due to the wide variety of belt structures.
The heating elements in these units are housed in a remote custom-built high temperature furnace and the heat is ducted into the heat exchanger. This chamber utilizes skirt board rubber seals and must be kept tightly sealed against the belt at all times. Clean-out access is through side or bottom doors, depending on design. The amount of material that accumulates in the chamber is somewhat more than what is typically found under the belt due to the drying process that takes place as the belt passes through the chamber. A high-volume air filter is required to pre-clean the air before heating.
Due to initial cost and constant maintenance, these heaters are only used when fuel is not readily available.



FUEL REQUIREMENTS, DIESEL

Oil-fired belt heaters are most commonly operated on the same fuel that is used in heavy equipment operating at subfreezing temperatures. #2 diesel fuel diluted with 25-30% kerosene is the norm. These units will also operate on straight kerosene which is somewhat more expensive and produces less heat than winter blended diesel fuel. If the fuel tank is filled with diesel fuel that is used during the summer season, it must be diluted with kerosene as described above to prevent it from congealing when the temperatures drop below freezing. In many instances existing tanks that are used for fueling heavy equipment can be utilized, eliminating the need to purchase a fuel tank.

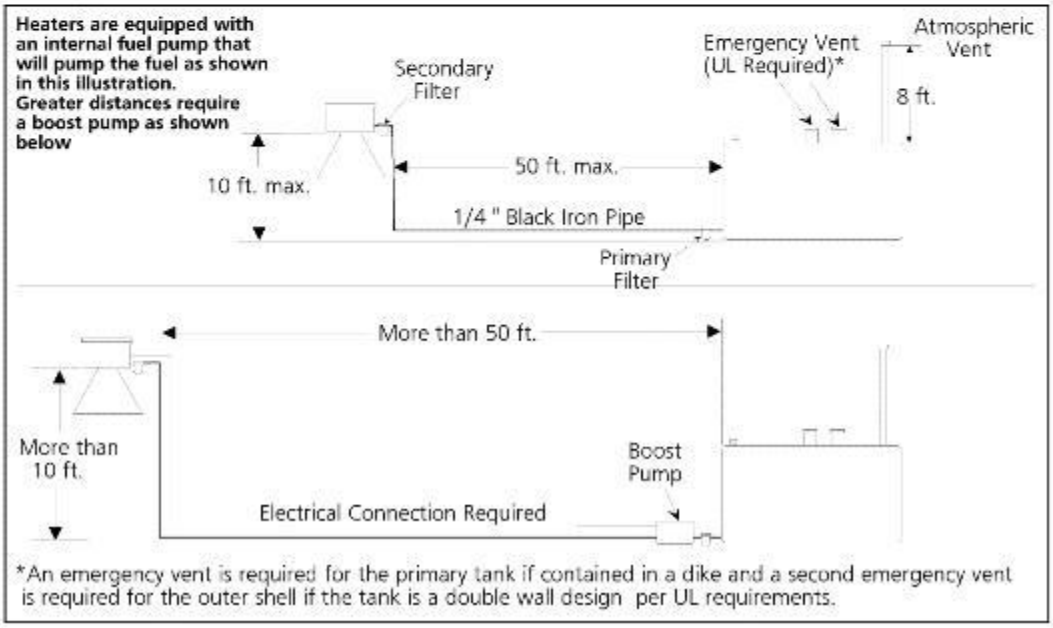
TANK SIZING, LOCATION AND SPECIFICATIONS

Tank sizing is based on the fuel consumption of the heater and the frequency of refilling that is available or desirable. Belt heaters have an adjustable firing rate/fuel consumption rate that is specific to the belt on which it is installed. This rate varies from 1/2 gallon per hour to as much as 5 gallons per hour. A typical 48" belt traveling at 450 ft. per min. requires 1 3/4 gallons per hour. To size the tank, multiply the gallons per hour that the heater is set to operate at by the hours operated per week and determine the weekly or monthly requirements and thus the most convenient tank size.

Locate the tank at least 25 feet from the heater and at least 50 ft. from any underground mine opening. Locate the tank in an area that is free from possible contact with moving equipment or provide protection for it if it must be located in a traveled area. The heater is equipped with an internally mounted fuel pump that is capable of lifting the fuel up to 10 feet. If the bottom of the tank is more than 10 feet below the heater or more than 50 feet from the heater, a boost pump will be required.

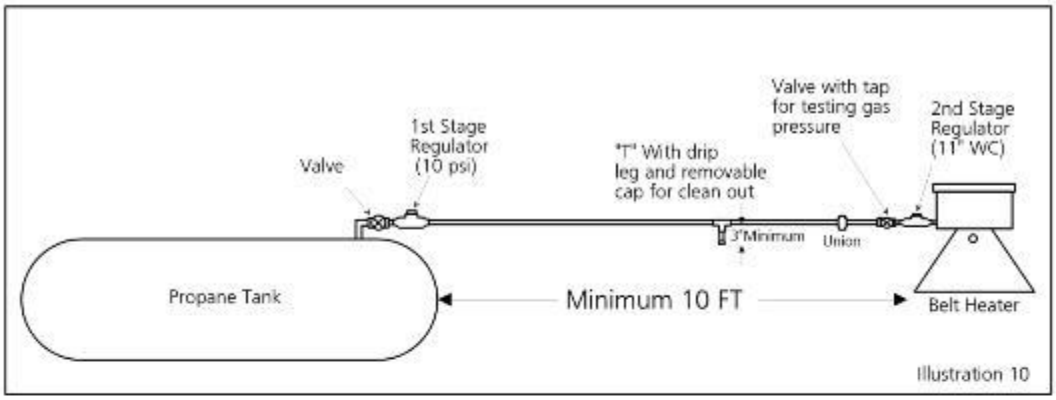
Tank specifications must meet MSHA, NFPA, UL and local code specifications. These typically require a diked or double wall design and must be vented per UL specifications. Local codes may vary. Contact your local fuel supplier to obtain specific information for your particular area. Thermo-Tech can supply tanks to meet your requirements or determine the proper tank for your installation. Call toll free (877) 693-7693 for assistance.

The best fuel line for this application is 1/4 " black iron. Install a filter at the tank in addition to the filter supplied with the heater.



*An emergency vent is required for the primary tank if contained in a dike and a second emergency vent is required for the outer shell if the tank is a double wall design per UL requirements.

GAS SUPPLY PIPE SIZING AND PRESSURE REQUIREMENTS



Natural or Propane gas pressure to the heater must not exceed 14" WC

Natural gas installations require a low pressure regulator 2nd stage (11" WC) at the heater.

Propane installations requiring long runs of pipe or multiple heaters operating from one tank are best suited to using a high pressure, 1st stage (10 psi) regulator at the tank and then reducing the pressure at the heater with a low pressure, 2nd stage (11" WC) regulator at the heater.

Installations where the heater is close to the tank are best suited to installing the low pressure regulator (2nd stage) at the tank, thus eliminating the high pressure regulator.

Table A. Pipe Sizing Data Natural Gas
Maximum deliver capacity of pipes of different diameters and lengths in cubic feet of gas per hour for an initial pressure of 2.0 PSI and a gas of .06 specific gravity. 1000 BTU per cu.ft.
Total Equivalent Length of Pipe (feet)

Pipe Size of Schedule 40 Standard Pipe (inch)

Length ft.	**10**	**50**	**100**	**150**	**200**
Pipe Size					
1/2"	1503	673	462	372	318
3/4"	3041	1360	934	751	642
1"	5561	2487	1708	1373	1174
1-1/4"	11415	5105	3508	2817	2413

cu ft per hr x 1000 = BTU hr

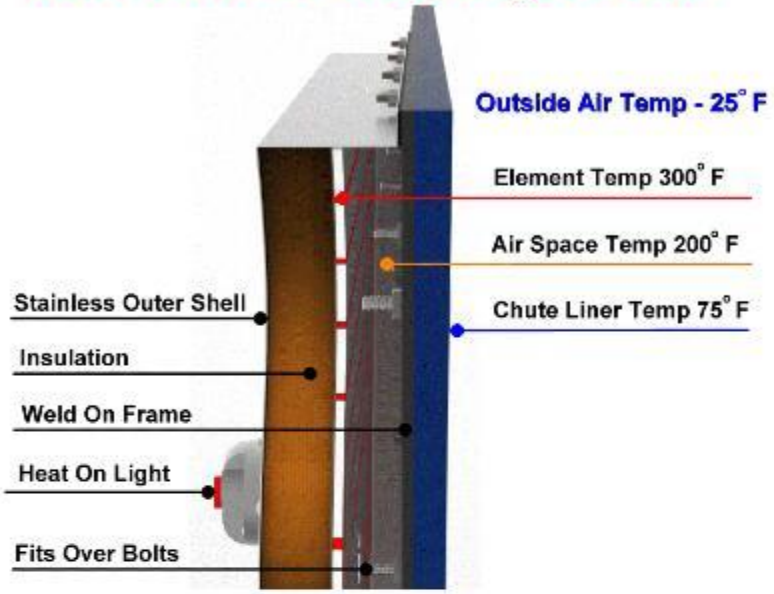
Eliminate Freezing HTR™ Panel System

Chutes, bins, hoppers, gates and more

- **Electrically heated panels custom fabricated to fit your exact application.**
- **Save as much as 90% on fuel costs compared to heating enclosures.**
- **Eliminate major construction costs and confined spaces.**
- **5 Year warranty on replaceable heating element, lifetime stainless construction.**
- **Available for flop gates, clamshell gates and sliding gates.**
- **Thermostat controlled, set it and forget it!**

ThermoTech™ *Heaters for conveyor belts and related components... Since 1984*

The HTR Panel System™



Specifications

120 - 240 - 480 Volts AC

12 -24 Volts DC

25 - 100 Watts per sq. ft. (50 watts standard)

Grade 304 Stainless cover

Standard 300° F panel is available up to 450° F

1", 2" or 3" Insulation

5 Year warranty on replaceable heating element.

How The HTR System™ Works

The HTR Panel System™ operates at 50 watts per sq. ft. for most applications. It is available with higher or lower watt ratings as required. The standard element temperature is set at 300° F and is available from any minimum temperature up to 450° F. The system can be equipped with an infinitely adjustable temperature controller if desired.

The 300° F setting will maintain the surface temperature approximately 100° F above the ambient air temperature using only 175 btu per sq. ft. of surface area to be heated.

Liners and wear plates including ceramic, stainless, hardened steel, UHMW, Tivar, etc. do not affect heat transfer.

Thermostat controlled, set it and forget it operation.

The HTR™ Advantage

Unlike silicone pad heaters which come in standard sizes, require a clean surface to bond to, won't fit over bolts and require a separate insulation process, the HTR Panel System™ can be welded to almost any painted, rusted, bent or beat surface. And, it requires nothing further than to be connected to an electrical power supply.

Unlike radiant and infrared heaters where most of the heat escapes or is overcome by air movement, the HTR Panel System™ is sealed and insulated thereby utilizing about 90% of the energy to heat the surface to which it is attached.

Unlike tiger torches, weed burners, torpedo heaters and the like, the HTR Panel System™ is not a fire hazard.

Unlike antifreeze and chemicals which are a hit and miss method in most instances, the HTR Panel System™ provides uniform heat around the clock and has no environmental issues.

HTR Panel System™ Features

Stand alone heating system for chutes, bins, hoppers, gates and more.

Custom design heats all of the surface area including the tapered corners where the freezing usually starts.

Save as much as 90% or more on energy costs compared to heating enclosures, only 175 btu (50 watts) per sq. ft. of surface area using the HTR Panel System™.

Allows clean up using skid steers and loaders compared to hand labor to clean out enclosures and buildings normally associated with heating bins and hoppers.

Easy installation, stitch weld in place and caulk. If removal is necessary for chute maintenance remove the retaining nuts and the mounting frame stays in place. The stainless steel studs in the mounting frame never rust or corrode.

Available for MSHA/OSHA Section 2 Div. 2 applications.

Junction box on each panel has four 1/2" openings allowing connections between multiple panels using flex conduit.

Heat Sliding Gates – sealed, not affected by water.

Weather proof, not affected by rain or snow.

Available in a range of heat output and insulation options. Select the most economical design for your situation.

Each system comes with controls incorporating a thermostat, ground fault breaker, thermal breaker, on/off switch and indicator light.

Retrofit flop and clamshell gates.

Install in any position.

Benefits Of Using The HTR Panel System™

Reduce heating costs as much as 90% compared to heating enclosures or using grossly oversized heaters.

Eliminate labor costs associated with freezing issues.

Eliminate downtime and lost production due to freezing issues.

Eliminate construction costs associated with enclosing bins and hoppers.

Install the system in 5% of the time required to build an enclosure.

Pays for itself in a short period of time in energy savings alone.

Heat inaccessable areas not possible with standard heaters.

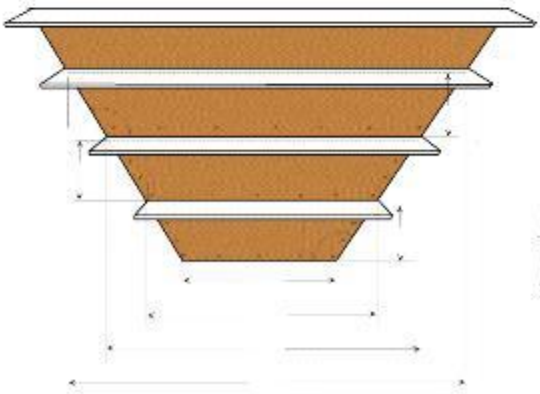
Not a fire hazard.

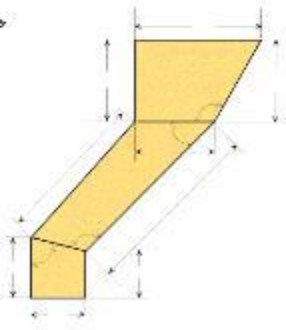
1 Million btu heater on chute that requires less than 2,500 btu to heat, which is 400 times more heat than required (400 times more cost).

Any Size, Any Shape, Any Position

Ordering Information

Each panel is custom built to your exact requirements. Email, fax or mail drawings with precise measurements required for your application. Drawings can be hand sketches, blue prints, AutoCAD, etc. Or, call for a field technician.





Installation

Panels come assembled, stitch weld in place and caulk.

Connect to current, set the thermostat and forget it.

Red pilot light comes on when internal temperature reaches 120° F.

ThermoTech™ Eliminates Freezing

533 William Avenue Davis WV 26260
1-304-259-5860 1-877-693-7693

Since 1984
www.EliminateFreezing.com

INTRODUCING

The *New* Point-Heater™

Heating • Thawing • Deicing, instantly!

Portable heat where you want it, when you need it.

Lightweight, easily moved. Sets up in minutes!

Unique, compact design and remote output enables direct heat exactly where needed:

- MSHA MRS No. 010104
- Stainless steel construction; unaffected by the elements.
- Smaller than comparable space heaters.
- 120/240 VAC 50/60 Hz operation from local power, integrated generator available
- Zero speed switch stops the heater instantly when used for conveyor belt deicing.
- Operates in dusty conditions; optional remote filtration for extreme conditions.
- Propane, diesel, kerosene or jet fuel.

Patented. Patent pending.

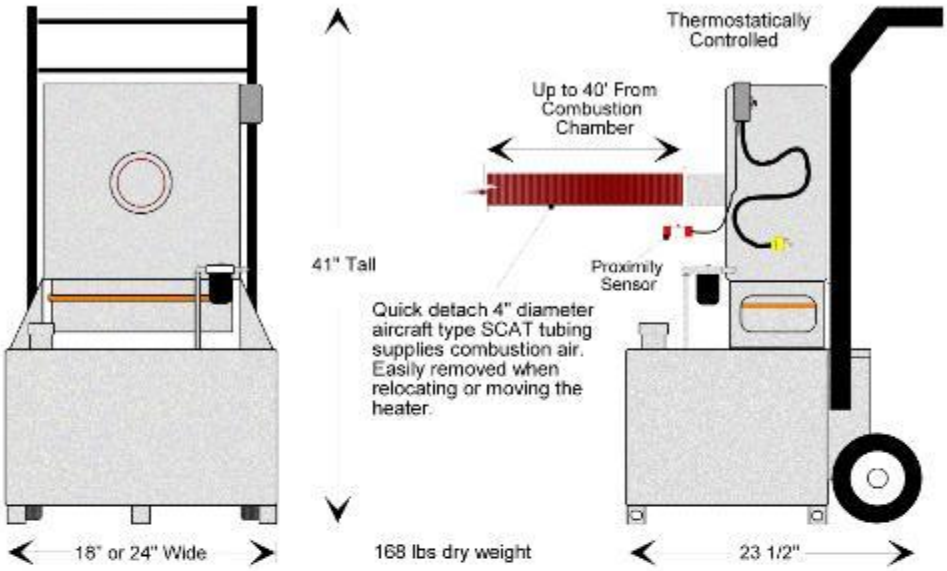
ThermoTech™

Providing unconventional heating solutions since 1984.

533 William Avenue • Davis, WV 26260 • www.Point-Heater.com

1-877-693-7693 • 1-304-259-5860

Point-Heater™ Specifications



When used on conveyor belts and related components, a proximity sensor monitors the belt movement and stops the heater instantly when the belt slows down or stops.

Interchangeable combustion chambers for any heating or deicing need.

35,000 - 400,000 BTU

- Eliminates downtime due to frost and ice on belts.
- Access many areas not possible with other heaters.
- Replaces costly antifreeze and its environmental issues.
- Replaces ineffective electric heaters.
- Eliminates weed burners and tiger torches.
- Automatic operation does not require monitoring, reduces labor costs.

ThermoTech™
Unconventional Heating Equipment

Thermo Tech Inc. 533 William Ave. Davis, WV 26260 • 1-877-693-7693 • 1-304-259-5860 www.Point-Heater.com

U.S. Department of Labor
Mine Safety and Health Administration
Technical Support
Approval and Certification Center
Engineering and Testing Division
Engineering Support Branch

Investigative Report

Thermo-Tech Heating Devices, Inc.

Belt Deicing Systems

Pertains to: MRS No. 010104

Date: May 2, 1994

Prepared by:

Arlie B. Massey
Supervisory General Engineer

TABLE OF CONTENTS

*** ABSTRACT

Technical assistance was provided to Coal Mine Safety and Health at the request of Allyn Davis, Chief, Division of Safety in the form of an evaluation of the suitability of Thermo-Tech Heating Devices, Incorporated's, Belt Deicing Systems for use on conveyor belts at surface coal mine applications. When installed in accordance with applicable National Fire Protection Association codes, these units should provide a safe and reliable method of deicing and/or defrosting belts and drive rollers in surface mine applications.

***INTRODUCTION

On March 7, 1994, a memorandum was received from Allyn Davis, Chief, Division of Safety, Coal Mine Safety and Health. This memorandum requested that the Approval and Certification Center evaluate the suitability of Thermo-Tech's Belt Deicing Systems for use on conveyor belts at surface coal mine applications.

In the past, numerous techniques have been used to prevent drive rollers and materials on belts from slipping during inclement weather conditions. Examples of techniques used have been personnel dumping sand or other materials between the belt and drive roller to increase friction, and salamanders and/or containers filled with mixtures of rags and kerosene and ignited to provide heat to rid the belts of ice or frost build-up. The use of such techniques has not been effective and in some cases, resulted in potentially hazardous use conditions.

DISCUSSION

Two types of belt deicers were evaluated under this investigation, fuel oil and LP gas fired units. Both units incorporate the following components:

1. An Underwriter Laboratories listed fuel oil or LP gas burner,

2. An Eagle tac switch with proximity sensor, and

3. A manufacturer's constructed stainless steel housing with a stainless steel heat directional chamber

Both types of units offer optional thermostatic controls.

According to the manufacturer, 138 fuel oil fired units have been manufactured. Each unit is serialized in ascending order of manufacture and records are maintained to track purchasers and how the units are used. Eight units are installed as furnaces heating mine entrance air and the remaining 130 units are installed on conveyor belts to defrost and deice the belts.

Since this product is similar to a fuel oil or LP gas fired home heating furnace, Underwriter Laboratory standard 727 for Oil-Fired Central Furnaces and American National Standards Institute Z21.64-1988 for Direct Vent Central Furnaces were reviewed for applicable safeguards. Following is a list of items which appear to be reasonable and applicable to the installation and use of this product.

1. **Safety Control – automatic controls (including relays, switches, and other auxiliary equipment used in conjunction therewith to form a safety control system) that are intended to prevent unsafe operation of the controlled equipment.**

2. **Safety Combustion Control – a primary safety control responsive directly to the flame properties; sensing the presence of flame and causing fuel to be shut off in the event of flame failure.**

3. **Thermostat – an automatic control actuated by temperature change to maintain temperatures between certain limits.**

4. **Fuel Control Safety Valve – a normally closed valve of the "on" and "off" type, without any bypass to the burner, that is actuated by a safety control or by an emergency device.**

A review of literature provided by he manufacturer and subsequent tests conducted at the manufacturing plant demonstrated that both the fuel oil fired units' and the LP gas fired units' Safety Control Systems provide a Safety Combustion Control and Fuel Control Safety Valve. The fuel oil fired unit accomplishes this through use of a cadmium sulfide cell while the LP gas unit uses an air purging feature and the flame rectification of an AC voltage.

The cadmium sulfide cell is a light sensing element that is installed at the entrance of the combustion chamber. It detects light from the burning fuel and provides unit shut down if the light is extinguished. Another feature provided by the cadmium position and light is detected in the combustion chamber from any source.

The air purging feature on the LP gas units forces air through the combustion chamber for 30 seconds prior to permitting fuel flow and ignition. This feature is intended to circumvent ignition of unwanted gas accumulations in the combustion chamber that could result in an uncontrolled explosion.

On March 22, 1994, a trip was made to Thermo-Tech Heating Devices, Inc., and Buffalo Coal Company. At Thermo-Tech, two Model A units, one fuel oil fired and one LP Gas fired, were tested to verify the operation of various safety devices. Following is a list of tests conducted on the fuel oil fired unit and results of the unit's performance.

1. Opening a lead to the cadmium sulfide cell produced unit shut down in approximately 45 seconds.

2. Preventing light from reaching the cadmium sulfide cell permitted the unit to start, but produced a unit shut down in approximately 45 seconds.

3. Shorting the cadmium sulfide cell prior to start up did not permit the unit to start.

4. Shorting the cadmium sulfide cell while operating did not shut the unit down, but would not permit the unit to restart following any other shut down.

5. Interrupting the arc produced immediate shut down.

The LP gas unit was tested by opening the flame rectification circuit. Opening this circuit produced unit shut down.

As expected, interrupting the flow of fuel on either the LP gas or the fuel oil unit produced unit shut down. The motors in all units are thermally protected and have manual resets.

After examination of the above units, the trip continued on to Buffalo Coal Company's preparation plant where the installation of seven (7) fuel oil fired units was observed. A meeting was held with Plant Superintendent Dave Bell in which it was reported that, "absolutely no problems have been experienced with any units after the initial debugging." Specific tests or compliance inspections were not conducted on the installed units.

National Fire Protection Association 31, Standard for the Installation of Oil-Burning Equipment was reviewed for applicable information. This standard contains sections that are reasonable and applicable to the fuel oil fired unit as designed and used. Applicable sections are:

1. Chapter 1 – General Provisions, Sections 1-1 Application and Scope, 1-2 Definitions, 1-4.2, 1-4.4, and 1-4.5 on unit installations, and 1-9 Electrical Wiring and Equipment.

2. Chapter 2 – Tank Storage, all Sections,

3. Chapter 3 – Piping, Pumps, and Valves, all Sections, and

4. Chapter 4 – Installation of Oil Burners and Oil-Fired Units, Section 4-3 Controls.

National Fire Protection Association 54-1992, National Fuel Gas Code was reviewed for applicable information. This standard also contains sections that are applicable to the LP-Gas fired product as designed and used. Applicable sections are:

1. Part 1 – General, Sections 1.1 Scope, 1.2 Alternate Materials, Equipment, and Procedures, 1.4 Qualified Agency, 1.6 Prevention of Accidental Ignition, and 1.7 Definitions,

2. Part 2 – Gas Piping System Design, Materials, and Components, Sections 2.3 Interconnection Between Gas Piping Systems, 2.4 Sizing of Gas Piping Systems, 2.5 Piping System Operating Pressure Limitations, 2.6 Acceptable Piping Materials and Joining Methods, 2.8 Gas Pressure Regulators, 2.9 Overpressure Protection Devices, and 2.10 Back Pressure Protection,

3. Part 3 – Gas Piping Installation, all Sections,

4. Part 4 – Inspection, Testing, and Purging, all Sections

5. Part 5 – Equipment Installation, all Sections

6. Part 8 – Procedures to be followed to place equipment in Operation, all Sections, and

4. Part 10 – Sizing Table for supply lines

All electrical connections made between belt deicing systems and electrical supplies and/or plant wiring should conform with National Fire Protection Association 70, National Electrical Code.

*** CONCLUSIONS

Fuel oil and LP Gas fired Belt Deicers, Models A, B, and C manufactured by Thermo-Tech Heating Devices, Inc. function as reported by Thermo-Tech's Heating Solutions brochure. When installed in accordance with the above mentioned sections of the National Fire Protection Association Codes, these units would be expected to provide a safe and reliable method of deicing and/or defrosting belts and drive rollers in surface mine applications.

*** RECOMMENDATIONS

It is recommended that fuel oil and LP Gas fired Belt Deicers manufactured by Thermo-Tech Heating Devices, Inc. be installed and used in accordance with the following provisions.

1. **The installation shall be performed by qualified competent personnel in accordance with the manufacturer's installation instructions.**

2. **Before placing into operation, fuel oil and LP Gas fired Belt Deicers shall be performance tested to insure that all controls and safety devices are properly functioning and that supply lines and fittings are leak free.**

3. **All electrical wiring and equipment shall be installed in accordance with the National Electrical Code.**

4. **Tanks used as fuel supply or storage tanks shall be listed by Underwriters Laboratories, Inc.**

5. **Fuel oil supply or storage tanks shall be vented to prevent the development of a vacuum or pressure that exceeds the design pressure of the tank.**

6. **Fuel oil and LP Gas supply tanks shall be guarded to alert equipment and vehicle operators of the tank location.**

7. **Fuel oil and LP Gas supply lines and fittings shall be brass or copper tubing, wrought-iron, or steel and installed to prevent accidental rupture by falling objects, moving equipment or vehicles.**

8. **Fuel oil and LP Gas fired belt deicers shall not be modified in any manner from that supplied by the manufacturer.**

9. **When fuel oil is used, facilities shall be provided to contain and prevent accidental discharge from entering neighboring waterways. The capacity of the containment area(s) shall not be less than the capacity of the tank(s) utilized.**

In instances where Underwriters Laboratories, Inc., listed tanks cannot be obtained, the tank shall be designed in accordance with National Fire Protection Association 31, Standard for the Installation of Oil-Burning Equipment or National Fire Protection Association 54-1992, National Fuel Gas Code as appropriate.

We are available to provide technical assistance in this area, if the need arises.