

Research & Development

Thorough testing and analysis is critical to producing heaters for the transit industry. Heaters must be tested under normal and abnormal conditions to confirm their suitability for safe, longterm operation in transit applications.

Transit authority specifications demand a strict balance between heat capacity, airflow and sound level which cannot be optimized without simulation, prototyping, and empirical testing. For these reasons CCI Thermal has invested heavily in a fully functional laboratory and test environment for research and development of our heaters.

We provide comprehensive product qualification testing including touch temperature, sound power level, shutdown cycling, extreme voltage, restricted air, backup protection, airflow uniformity, air velocity, shock and vibration, volumetric flow rate, flame-smoke-toxicity and heat capacity.

Our engineering capabilities include complete mechanical and electrical engineering design, industry leading application expertise, 3D design, modeling, and prototyping.

The cumulative experience of our research and development team makes CCI Thermal heaters the most advanced and refined in North America.



Shock and vibration testing of a Forced Air Cab Heater and a Toilet Room Duct Heater in longitudinal test axis in accordance with IEC61373 test specifications.

Sound power level testing of a Forced Air Cab Heater in an anechoic sound chamber with single reflecting plane and hemispherical measurement array.

Thermal testing of Forced Air Cab Heater with associated duct work for floor and windshield air discharge.



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Manufacturing Capabilities

With three facilities in Canada and two in the United States, CCI Thermal has the flexibility to meet Buy America and Buy Canadian content requirements. CCI Thermal is accredited with over 90 plant and product certifications and has been recognized as one of Canada's 50 best managed companies since 2006.

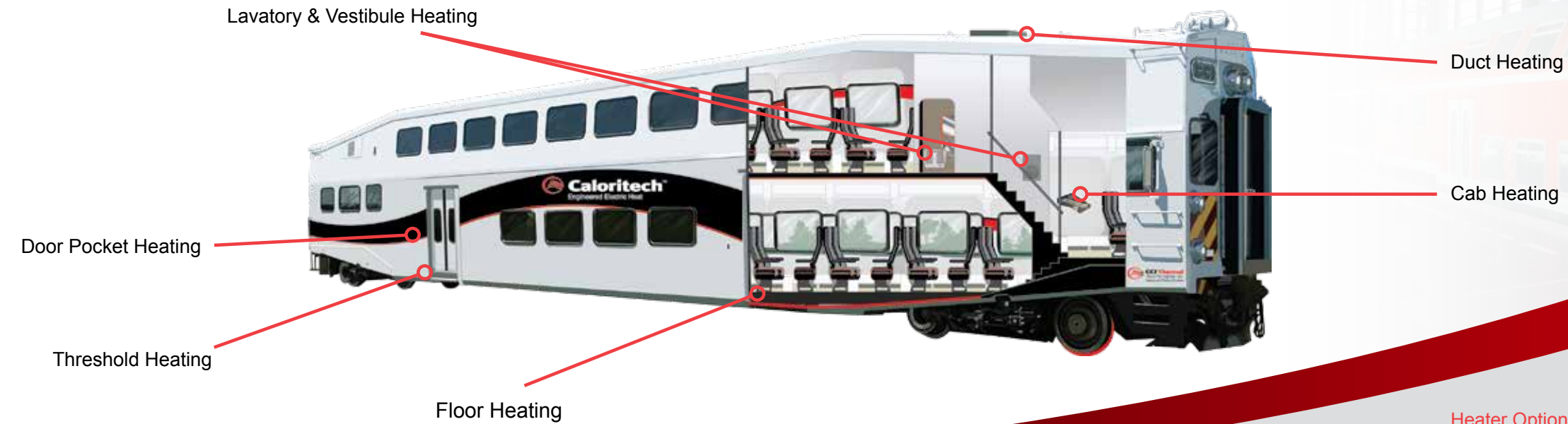
Heating Solutions for the Transit Industry



About CCI Thermal Technologies Inc.

CCI Thermal Technologies' dedication to provide advanced, high-quality heating products for transit applications has resulted in the most widely used and trusted product offering in North America. This trust has been built through the development of custom heating solutions for a long list of major North American rail projects.

CCI Thermal's progressive technology, experienced design team and use of high quality components ensures the durability and high performance of our heaters. With Canadian and American manufacturing capabilities, CCI Thermal Technologies can provide heating solutions perfectly tailored to your needs.



Duct Heaters

Our extensive offering of advanced elements is perfectly suited for overhead duct heaters in transit applications. Elements are designed to customer specifications and optimized for maximum reliability and performance. The elements are mounted in a rigid metal frame and braced to withstand high shock and vibration while maintaining accessibility for ease of maintenance.

Heater Options:

- Elements: Open coil, tubular, finned tubular
- Element Configuration: Straight, Hairpin, W-shape, Helical

Key Features:

- Fully protected against mechanical shock, vibration or breakage.
- Low element mass yields relatively small amounts of residual heat on fan shut down, reducing heat effect on surrounding material.
- Static pressure drop through open coil is very low, reducing fan horsepower requirements.



From left to right: Open Coil Overhead Duct Heater; Tubular Overhead Duct Heater; Finned Tubular Overhead Duct Heater

Forced Air Heaters

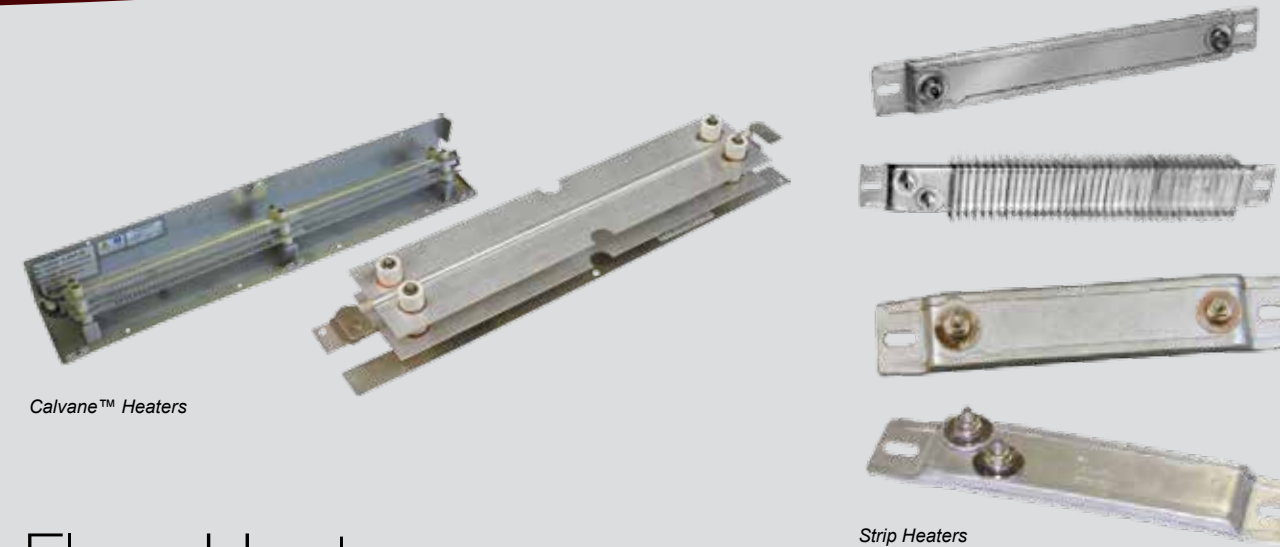
CCI Thermal is the North American leader in custom engineered forced air heating solutions. These heaters maximize heat capacity and airflow while minimizing noise and grill temperature. Our heaters are designed to customer specifications with the optimal enclosure material, elements, fan, connection type and thermal protection to ensure safe and efficient operation. Traditional fan forced styles include cab heater, defroster/defogger, vestibule, lavatory, baseboard, portal and under-seat heaters.

Heater Options:

- Enclosure Material: Stainless steel, steel, aluminum, anodized aluminum and more
- Elements: Open coil, tubular, strip heater, Calvane™
- Fans: Axial, centrifugal, radial

Key Features:

- Rugged/robust design
- High resistance to shock and vibration
- Fast heat up and cool down response times
- Easy to install
- Light weight
- Low Noise
- High quality components
- Long lifespan



Calvane™ Heaters

Strip Heaters

Floor Heaters

CCI Thermal's advanced heating elements are specifically designed for transit applications and are the ideal solution for floor heating passenger compartments. Safety, reliability and performance are the main drivers in developing transit duty floor heaters for numerous car builders and transit authorities across North America. The patented Calvane™ element design is unlike any other floor heating element utilizing an aluminum sheath with integrally extruded fins for an extended heat transfer surface. Nickel chromium resistance wire or ribbon and high grade magnesium oxide insulation combine to provide maximum life expectancy. This element provides a faster heat up and cool down period while being lighter than any other standard strip heater.

Heater Options:

- Elements: Calvane™, louvered Calvane™, strip heater, finned strip heater, tubular, finned tubular
- Element Material: Aluminum, aluminized steel, stainless steel, nickel plated

Key Features:

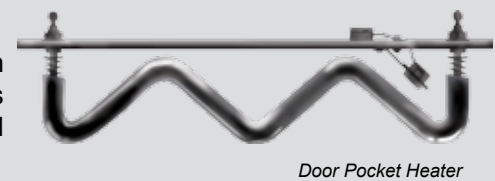
- Low watt density for long life performance
- Fast start-up and cool down periods
- No magnetic noise
- Low pressure drop
- Resistance to damage from shock and vibration
- Easily isolated for high voltage applications
- Uniform heat distribution

Threshold & Door Pocket Heaters

CCI Thermal's line of threshold and door pocket heaters are waterproof and durable to withstand the wet and rugged conditions found in this area of the car. Each Calbar™ element has a flat, contoured surface to maximize heat transfer and is tested under water for 24 hours to ensure integrity.

Door Pocket:

These heaters are engineered to eliminate frost and snow from interfering with door operation. We offer a variety of designs incorporating strip heaters, tubular elements or silicon pad heaters.



Door Pocket Heater

Threshold:

Threshold heaters eliminate frost and snow build up on door threshold areas to help passengers safely enter and exit the train. Only CCI Thermal offers the robust Calbar™ element for threshold heating applications. Tubular style heating elements and silicone pads are also available.

Key Features:

- Watertight design
- Durable construction
- Resistance to shock, vibration and friction
- Compact size
- Corrosion resistant



Threshold Heater (Calbar™)



From left to right, examples of Forced Air Cab Heaters