



Compressed Natural Gas and Propane Vehicle Maintenance Facility Heating Solutions

Cata-Dyne™ Heating Package White Paper

By Michael Arbour-Neagoe

Abstract

The engineers at CCI Thermal Technologies Inc. have developed an innovative heating system for Compressed Natural Gas (CNG) Re-Fueling facilities.

This white paper explains the advantages of the Cata-Dyne™ CHS Heating Package when compared to traditional heating methods used to heat maintenance and re-fueling garages of public transit vehicles operating on CNG. It also details the various specifications and options available with the CHS package.

The Challenge

For years, diesel has been the “fuel of choice” for municipal transit vehicles. Large bus maintenance and refueling facilities could safely be heated with electric or natural gas fired heaters. Since diesel fumes are heavier than air, risk of explosion was minimal if the heaters were mounted high in the facility.

In recent years, pressure to reduce carbon emissions and improvements in gas engine design, have encouraged

many municipalities and school districts to switch from diesel to CNG. Many maintenance and re-fueling garages are now fully converted to storing and dispensing CNG for vehicles. This change has highlighted a key limitation in traditional heating technologies. Natural gas is lighter than air and fugitive emissions from the refueling process tend to accumulate at the top of the building. This creates an explosion risk if the gases come into contact with traditional heaters.

CNG maintenance and refueling facilities are now areas in which potentially explosive conditions could exist, in other words “hazardous locations”. These locations require specialized heating equipment that can operate safely in the presence of explosive gases.

The Solution

The challenge was closely studied by the engineers at CCI Thermal Technologies. The heating systems for this application require specialized design features, manufacturing methods and third party certification to ensure that they are “explosion-proof”. CCI Thermal is a leading

manufacturer of explosion-proof equipment intended for use in hazardous locations, such as CNG maintenance and re-fueling facilities.

The engineers at CCI Thermal have come up with a clever and effective solution by combining the industry leading Cata-Dyne™ Infrared Gas Catalytic Heater with an explosion-proof control panel utilizing CCI Thermal’s patented **x-Max**® explosion-proof terminal housing.

The use of a gas catalytic explosion-proof heaters in a CNG facilities makes perfect sense because the heaters operate on CNG, the same fuel used for the vehicles.



The Cata-Dyne™ Heater and Control Panel

The Cata-Dyne™ heater is a marvel of engineering. At its heart is a catalytic pad impregnated with a proprietary noble metal catalyst. At start-up, the heater needs to be pre-heated to around 250°F in order to activate the catalyst. The Cata-Dyne™ does this with the aid of electrical elements located just below the pad.

As the catalyst activation temperature is reached, natural gas is introduced through the back of the heater. An exothermic chemical reaction takes place whereby infrared energy is one of the main byproducts of combustion. There are no moving parts inside the heater. Once started, the heater only requires fuel to operate and, most importantly, there are no harmful CO, NO_x or SO_x gases produced. This is possible because the Cata-Dyne™ combusts or oxidizes the methane gas without a flame. The heater is certified by the Canadian Standard Association (CSA) and Factory Mutual (FM) for use in Class I, Division 1 & 2 Group D hazardous locations, and if methane gas is present around

the proximity of the heater it will be consumed by the heater as another source of fuel. These attributes makes the Cata-Dyne™ the ideal choice of heating systems for use in CNG or LNG facilities.

The Cata-Dyne™ heater is started and modulated by an innovative control panel developed by CCI Thermal’s engineers. The available options allow the control panel to be configured to create a low cost manual system or a semi-automatic system, which can be configured for automated operations once all heaters have been turned on. The control panel is unique in design and is certified by CSA for use in hazardous locations, Class I, Division 1 & 2 Group D, like the Cata-Dyne™ heaters. The panel also utilizes the patented **x-Max**® explosion-proof terminal housing – a unique explosion-proof electrical enclosure used to house electrical terminations and arcing and sparking devices such as contactors.



Cata-Dyne™ Heating Package Specifications

Heater:

- Proprietary Cata-Dyne™ catalyst pad.
- Corrosion resistant 300 series stainless-steel construction.
- Natural gas or propane operation.
- Electric start available in 120V - 600V.
- Individual heater models range from 10,000 - 60,000 Btu/hr.
- No moving parts and designed to operate indefinitely when supplied with clean fuel and adequate ventilation.
- Heaters can be strategically located to maximize heat intensity.
- CSA certified for use in Class I, Division 1 & 2, Group D hazardous locations.
- Certified to ANSI Z83.20a-2010/CSA2.34a-2010.
- NFPA 30A Compliant.

Control Panel:

- Single switch ON/OFF/STANDBY control.
- -18°C to 38°C (0°F to 100°F) Thermostat.
- Interlock terminals for integration with ancillary equipment.
- Single point control of multiple heaters.
- Automated start-up, control and shutdown systems are available.
- Floor level access to all control functions.
- Interlock terminals for remote "Enable" & "Standby".
- Self-diagnostic fault indication.
- CSA certified for use in Class I, Division 1 & 2 hazardous location areas.
- Custom options available.
- Remote thermostat for each zone.

CCI Thermal engineers can provide any custom design specific to your application - whether it is a low cost manual heating system or a more sophisticated system with automatic control capabilities.

Conclusion

Traditional heater designs can no longer safely be used to heat CNG converted garages and facilities. CNG maintenance and re-fueling garages by definition will create a hazard, as light hydrocarbon gas leaking during the re-fueling process forms a dangerous and hazardous area, as gases accumulate in the upper section of the building.

The CCI Thermal engineers have developed a safe, easy-to-use and low cost heating system for such applications by utilizing the industry standard Cata-Dyne™ gas catalytic infrared heater with a customized control panel using CCI Thermal's patented **x-Max**® explosion-proof terminal housing.

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