



Turn to the experts

## Aquazone™ Commercial Geothermal Heat Pump Systems



Delivering High Efficiency Space Conditioning from the Ground Up





## Aquazone™ Commercial Geothermal Heat Pump Systems

Aquazone™ geothermal heat pump systems offer commercial property owners the opportunity to give new or existing facilities the energy edge, from the immediate benefit of dramatically lower heating and cooling costs to the long-term value of a property with a low-maintenance, state-of-the-art conditioning system. Backed by the Carrier commitment to energy efficiency and industry-leading innovation, commercial property owners can move confidently into a sustainable future where the rising cost of fossil fuels has minimal impact on operating budgets.



Aquazone geothermal systems take advantage of the earth's natural reservoir of stable temperatures below the frost line. During the winter, the Aquazone geothermal system removes heat from the ground to heat the building. In the summer, heat is removed by the Aquazone geothermal system and rejected in to the ground. When properly designed and sized, an Aquazone geothermal system can provide comfortable, highly efficiency heating and cooling, in a variety of climates and commercial building types.

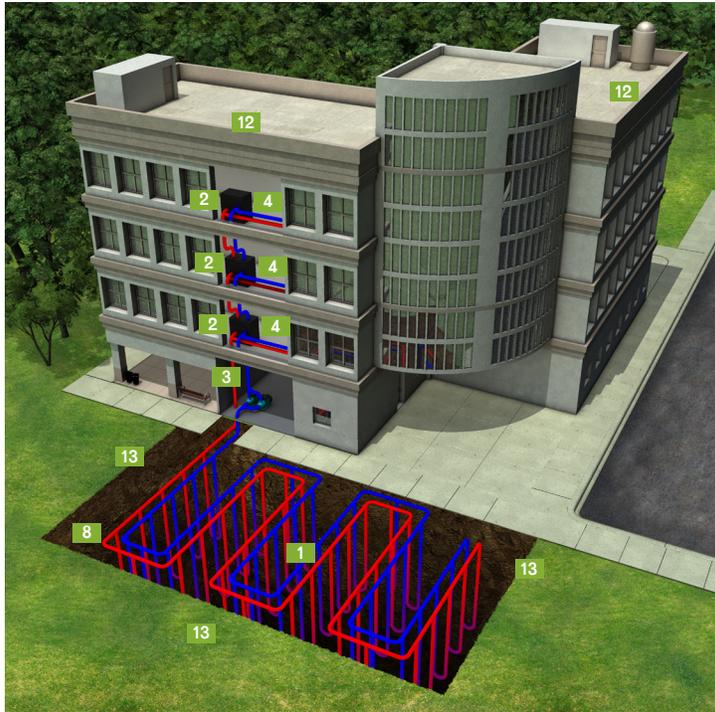
Aquazone geothermal systems typically provide comfortable conditioned spaces at energy costs 25-50% lower than a conventional heating and cooling system.

Quiet, zero-emissions Aquazone geothermal systems are an ideal heating and cooling technology for new buildings that seek LEED®<sup>1</sup> (Leadership in Energy and Environmental Design) certification. Since geothermal systems conserve energy and lower CO<sub>2</sub> emissions, they contribute to a favorable LEED rating. Aquazone geothermal systems are also an excellent choice for facilities where exterior aesthetics or interior space is a priority. Since the Aquazone geothermal system has minimal exterior components, they do not compromise rooflines or exterior walls. Aquazone geothermal systems are compact when compared to other types of systems, which can save interior space and reduce the size of mechanical rooms.

With its 20+ year life cycle, low maintenance costs and ongoing energy savings, the Aquazone geothermal system is a fiscally prudent investment for any commercial property owner seeking to maximize property value and buffer against the uncertain fuel costs of the future. Furthermore, federal, state and local "clean energy" incentives make Aquazone systems a more prudent investment for any commercial or educational property.



# Aquazone™ Commercial Geothermal System



- 1 In a ground loop system, a polyethylene pipe loop containing water or a water/non-toxic anti-freeze mixture is run in the ground from as little as three, to as much as several hundred feet deep. This water loop serves as the heat transfer medium between the ground and the Aquazone geothermal heat pump units.
- 2 In the winter, the Aquazone geothermal heat pump units transfer heat to the building from the ground. The heating efficiency of the heat pump benefits from the relatively warm ground temperature. In the summer, the heat pumps extract heat from the building and transfer it to the ground. The cooling cycle efficiency of the heat pump benefits from the relatively cool ground temperature.
- 3 A pump system circulates fluid between the Aquazone geothermal heat pump units and the loop system to facilitate the heat transfer. The pump systems can be controlled by a Carrier open loop controller.
- 4 Aquazone geothermal heat pump units can be controlled via Carrier WSHP open DDC controls or via thermostat.
- 5 Up to 21.1 EER and 4.3 COP at AHRI ground loop conditions.
- 6 Zero on-site carbon emissions.
- 7 Supports multiple comfort zones.
- 8 Ground-source unaffected by ambient conditions.
- 9 Requires dedicated outdoor air system for ventilation.
- 10 Simple maintenance can be done by facilities staff.
- 11 Small equipment room required for hydronic pumping.
- 12 Clean rooflines.
- 13 Ground area required for loop field installation.
- 14 Variety of heat pump models to fit site requirements.

## Typical VAV System

- 1 The rooftop unit provides comfort cooling only. Subject to extreme outdoor temperatures during hot and cold months.
- 2 The rooftop unit is supplemented by electric or gas heat for tempering and morning warm-up. Space heat is provided in the VAV terminal unit.
- 3 Through the refrigeration process, the rooftop unit provides cooling to space. At certain times when ambient is ideal, economizer operation will occur. Rooftop unit provides constant temperature; VAV box will modulate damper to maintain space conditions.
- 4 The system is operated via direct digital controls.
- 5 10.8-12.8 EER at AHRI conditions.
- 6 Varying carbon emissions.
- 7 Supports multiple comfort zones.
- 8 High/low ambient conditions may require additional options in some environments.
- 9 Does not require dedicated outdoor air system for ventilation.
- 10 Maintenance typically performed by qualified personnel.
- 11 No equipment room required.
- 12 Equipment visible on roof space.
- 13 No ground area required.



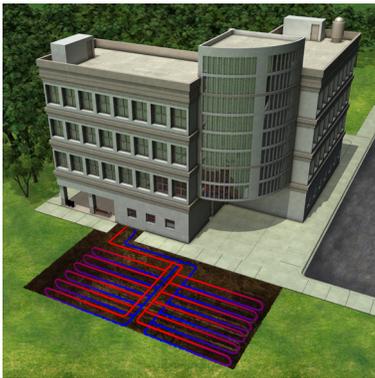
# Aquazone™ Geothermal Systems for Every Site

Carrier Aquazone geothermal technology can be configured to accommodate diverse site and cost considerations. The actual number, spacing and depth of geothermal loops — and number, model and configuration of Aquazone geothermal heat pumps — varies from building to building, according to the requirements of the individual property.

Below are three common types of geothermal systems. For more detailed information about the system best suited to your building's site and demands, please contact your local Carrier Expert.

## HORIZONTAL GROUND LOOP SYSTEMS

In horizontal ground loop geothermal systems, the geothermal pipe loop is buried in trenches below the frost line. Each trench may hold from one to several loops of pipe. The ground loop configuration offers lower excavation costs than a vertical loop system, and works well on sites with open land such as playing fields or park space.



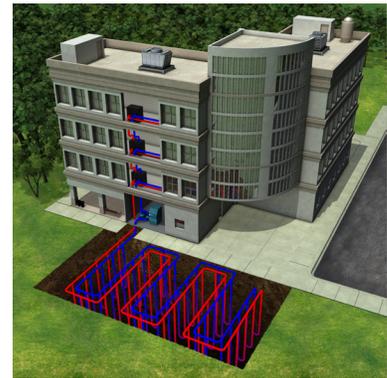
## POND/LAKE LOOP SYSTEMS

Water loop geothermal systems use existing water features such as a lake to house the geothermal spool type piping loop. The natural temperature stability of the water provides the same benefits as an earth-buried system with no excavation costs.



## HYBRID BOILER AND COOLING TOWER SYSTEMS

In instances where a commercial property owner wants the efficiency of geothermal conditioning with lower first costs, a hybrid system may be used. Hybrid systems incorporate a boiler or cooling tower along with a smaller geothermal ground loop field, gaining much of the efficiency of a pure geothermal system while reducing the excavation and materials cost of loop installation.



## Benefits at a Glance

### For Building Owners and Managers

- Delivers greater occupant comfort
- Quiet operation
- Low life-cycle costs
- Reliable operation
- Supports LEED® certification

### For Consulting Engineers

- ASHRAE 90.1 compliant
- Quiet operation
- Reduced energy consumption
- High efficiency
- Plug-and-play design

### For Contractors

- Extensive factory-installed options
- 100% run-tested
- Easy to start up and operate
- Easy to service
- Proactive diagnostics



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