

# Gas Absorption Reversible Heat Pump System

## Civil Engineering

Arco (Trento) - Italy



Heating and cooling is provided by 3 ROBUR gas fired absorption reversible heat pumps (Model GAHP-AR) that are installed in this innovative application, a valid alternative to traditional electric compression systems. The building, which serves as headquarters for a Civil Engineering group, is located in a small business area and consists of offices, a large open space and a conference room. The heating and cooling system required outside air- exchanges for those rooms located in the building's core area. The first

obstacle for installation of an entire HVAC system was due to the fact that the facility was not equipped with an indoor equipment room and other industrial buildings are located on 3 of its 4 sides. Due to space limitations the systems for the production of heating and cooling energy have been installed outdoors, on an accessible flat roof. The air handling units were installed in the false ceiling on the first floor, using the ceiling space for installation of fresh air intakes and necessary ductwork.



Heating



Cooling

The average seasonal efficiency is 35% higher than condensing boilers and 45% higher than non-condensing boilers. During a typical heating season the Robur absorption system should provide an annual natural gas savings of approximately 42,000 cubic foot per year over a standard boiler. A rapid return on investment of less than 2 years is achievable.



**answer this requirement and proved to be a good-value.**

Given the project heating capacity up to 307,100 BTU/h and cooling capacity up to 170,600 BTU/h, three Robur GAHP-AR units were installed and piped in parallel on a primary hydronic circuit. The individual circulation pumps and the staging management of the 3 units provide a constant outlet water temperature to match the seasonal peak load.

Located on the building's roof, the heat pumps have been installed on a single steel frame and piped to 2 outlet and inlet manifolds.

The application described here, managed by Robur's Direct Digital Controller (DDC), results in a modular system for the production of either hot or chilled water. In both cases the group of units are staged to match the load requirement of the building and provide exceptional operating efficiency and redundancy.

Three appliances were taken into consideration:

- Air-water heat pumps powered by electric compressors;
- Modular condensing boilers for outdoor installation combined with an electric chiller;
- Gas fired reversible absorption heat pumps.

The first option was rejected, because of the extreme winter temperatures.

The second option reviewed consisted of an electric chiller combined with a condensing boiler. This application involved greater complexity, since on the same system a boiler grouped with an electric chiller should be installed to operate alternatively either in summer or in winter.

**The Robur reversible gas fired absorption heat pumps could**

|                            |   |
|----------------------------|---|
| Building type              | Office  |
| Surface                    | 5,600 sq. ft.   |
| Energy distribution system | Both built-in and wall hanging units, with variable speed blowers |
| Unit number and type       | 3 GAHP-AR Gas Absorption Reversible Heat Pumps                    |
| Heating capacity           | 619,000 BTU/h   |
| Cooling capacity           | 284,800 BTU/h   |

