**Triple Effect Absorption Chiller-heater**

**Features** Heat Source Equipment for Air Conditioning

- **Freon Free:** Absorption chiller-heaters contain “water” as refrigerant and Freon gas which has high global warming potential is not used.
- **Low Electricity Consumption:** Absorption chiller-heaters provide chilled water by means of natural gas combustion, which contributes to significant reduction of electricity consumption.
- **The world's First Triple Effect Absorption Chiller-heater:**
  - In 1968, we commercialized the world’s first double effect direct fired absorption chiller-heaters.
  - In 2005, we commercialized the world’s first triple effect direct fired absorption chiller-heaters.
  - Natural gas consumption is further reduced by upgrading from double effect type to triple effect type.
- **The highest COP in the world**
  - 1.6 (Higher Heating Value basis)
  - 1.7 (Lower Heating Value basis)
- **Application for gas engine co-generation system is also available.**

**Basic Concept or Summary**

Construction of the triple effect absorption chiller-heater (Image)

- The triple effect absorption chiller-heaters have three generators and lithium bromide solution is generated in three steps.
- The triple effect absorption chiller-heaters have been developed by combination of a double effect steam fired absorption chiller as a base machine and a once-through boiler as a new high temperature generator.
**Effects or Remarks**

**Grand Reduction in CO2 Emission**

For example, in the case of cooling capacity 651 kW (185 RT), annual CO2 emission can be reduced by approximately **140 tons** compared with conventional types.

- The energy consumption is lower by 38% compared with double effect type (COP = 1.0) which is commonly operated now.
- The COP in the partial load area can be improved by the optimum inverter control for solution pumps.
- Total motor output is only "6.5 kW in the case of 185 RT".
- Awards received

  February 2006: The Japan Institute of Energy Progress Prize (Technology Division)
  June 2006: The 8th Electric Load Leveling Equipment, System Award
  The Heat Pump & Thermal Storage Technology Center of Japan, Chairman Prize
  January 2007: The 17th Energy Conservation Grand Prize
  The Energy Conservation Center, Japan, Chairman Prize
  June 2008: The Japan Gas Association Technology Prize of FY2008

**Maximum Efficiency COP1.7**

Being equipped with the new solution circulation inverter control (the patent is being applied for) as a standard function, the maximum efficiency **COP1.7** is achieved in the partial load area where the system is most frequently used.

- **Reduction approximately 140 ton-CO2/year**
- **Maximum Efficiency COP1.7**

**Installation in Practice or Schedule**

**Domestic**
Delivered mainly to factories, hospitals, general buildings, etc.
Number of deliveries: 18 units

**Overseas**
Based on the deliveries in Japan, overseas sales activity is under way.

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