

Hybrid type absorption chiller, Sigma Ace Gene-Link 1.43 series (TZJ)



Waste heat utilization is attracting attention as technology that can contribute to saving energy, reducing CO₂ emissions and protecting global environment. We developed our first waste heat utilization type absorption chiller in 1959. We developed the first hybrid type absorption chiller named the Gene Link in 1998, and since then we have been enjoying a good reputation from the market. A hybrid type absorption chiller can operate with waste hot water alone at partial cooling load, and is equipped with fuel combustion equipment as a backup of waste heat. We newly developed a hybrid type absorption chiller (TZJ model) that can reduce fuel consumption rate by 8% compared with conventional models.

Preface

Currently, social demand is increasing for a reduction of CO₂ emissions as a preventive measure to global warming. A hybrid type absorption chiller can utilize waste heat such as hot water from combined heat and power (CHP) and operate without fossil fuels at partial cooling load.

As a result, the chiller can contribute substantially to reductions in fuel consumption and CO₂ emissions.

The TZJ combines our unique technology of a fuel-fired type chiller and a waste heat utilization type chiller.

1 Overview

Table 1 shows the main specifications of the TZJ and Fig. 1 shows its cycle flow in cooling operation.

The TZJ realizes high energy-saving efficiency by adding waste heat recovery technology to a fuel-fired absorption chiller "Sigma Ace 1.43 Series" (TZG).

Three major gas supply companies in Japan approved the TZJ as a Green Type Absorption Chiller which represents high efficiency partial load characteristics and reduction of environmental load.

2 Features

(1) 30 % reduction in fuel consumption in rated operation

In order to improve efficiency in not only rated operation but also partial load operation, we adopted high efficiency heat transfer tube to evaporator, absorber and condenser, and we optimized solution circulation. As a result, in the

case of rated operation with hot inlet water, a 30% energy reduction can be realized by the TZJ compared with operation without hot inlet water.

(2) High efficiency partial load characteristics

The TZJ is equipped with an inverter control system for each solution pump in order to optimize solution circulation and improve efficiency at partial load.

Cooling operation with hot inlet water alone can be realized up to a 50% cooling load by optimum solution circulation.

(3) Various gas engines can be combined to the TZJ

The heat recovery rate of the TZJ is 20% more than that of conventional models. The TZJ is adaptable to various types

Table 1 Main specifications

Item		TZJ
COP (Cooling mode) (LHV)	Operation with hot inlet water	2.06
	Operation without hot inlet water	1.43
COP (Heating mode)	(Operation without hot inlet water)	0.86
Chilled water	Inlet/Outlet temperature (°C)	15.0 → 7.0
	Flow rate (m ³ /h·RT)	0.378
Cooling water	Inlet/Outlet temperature (°C)	32.0 → 37.6
	Flow rate (m ³ /h·RT)	1.00
Waste hot water	Inlet/Outlet temperature (°C)	90.0 → 80.0
	Flow rate (m ³ /h·RT)	0.115
Energy reduction rate in rated operation with hot inlet water (%)		30
Maximum cooling load with hot inlet water alone (%)		50

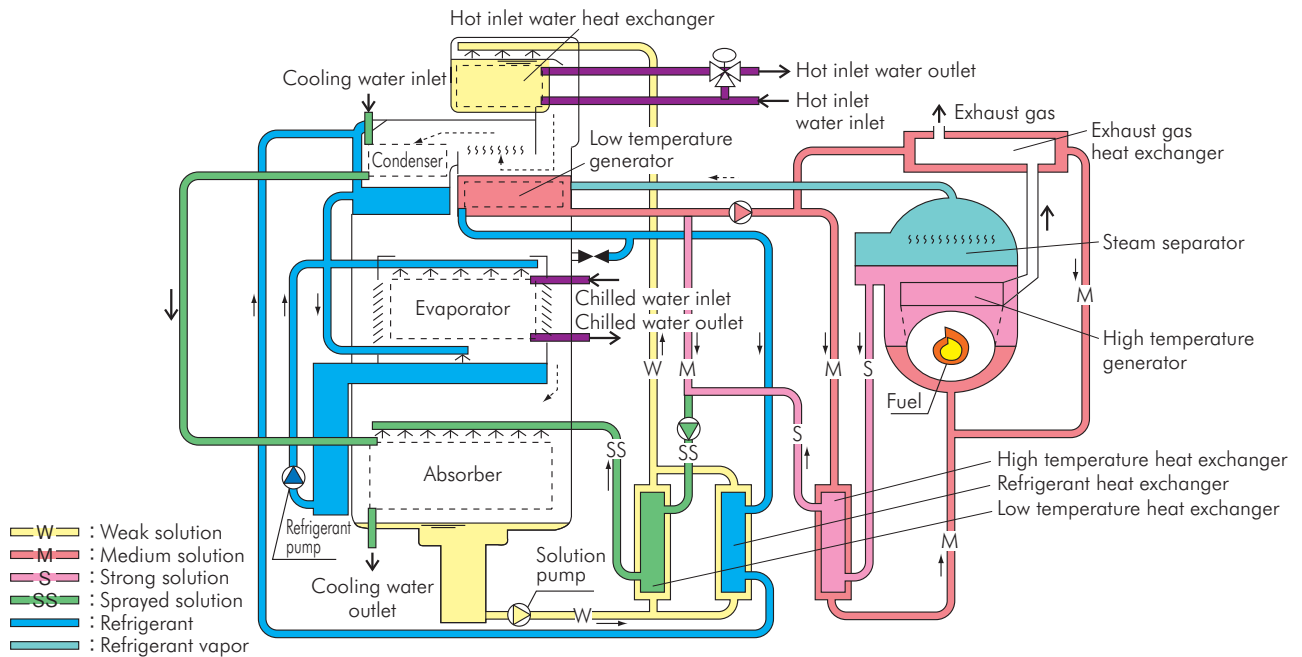


Fig. 1 Cycle flow (Cooling)

of gas engines unlike conventional models. For example, it has become possible to select the most appropriate model even for a CHP system where power demand is bigger than cooling demand.

Postscript

Currently, CHP projects are increasing in Japan in response to the needs for distributed power supply. The TZJ has many special features as mentioned in section 2 above and is suitable for CHP systems.

We newly developed a flagship chiller named Efficio to succeed to our main brand Sigma Ace. We release Efficio (Fig. 2) to Japanese market from April, 2013 and to overseas market in the latter part of 2014. Direct-fired type of Efficio has three best characteristics:

- COP at rated operation
- IPLV (Integrated Part Load Volume)
- System efficiency, i.e. total energy consumption as an air conditioning system is most effective in double effect absorption chillers.

In particular, COP at rated operation is the world's highest value of 1.51 in double effect direct-fired absorption chillers. Direct-fired type of Efficio has three products lineup, NZ model (COP 1.51, LHV), NU model (1.39) and NE model (1.33) and cooling capacity range of three models is from 80RT to 1000RT. NZ model is the highest COP machine and NU model is the highest IPLV machine of double effect absorption chillers in the world.

We release direct-fired type first. Waste heat recovery type such as hybrid chiller and steam-driven type will

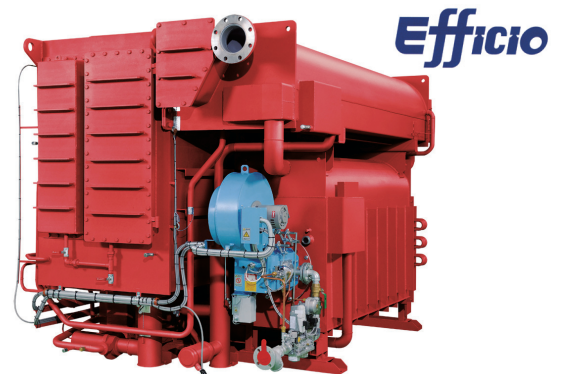


Fig. 2 Overview of Efficio

follow based on unique technology of direct-fired type.

Finally, we are convinced that all of our products will contribute to energy-saving and the global environment. We will focus our efforts on the development of highly efficient and highly reliable absorption chillers.

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