

## Sales & Services



YAZAKI is about much more than just selling chillers. We provide our customers with sales and services throughout the entire value chain. To enable us to quickly and reliably deal with all of our customers' needs across the whole of Europe, we work with a network of highly specialized and greatly experienced distribution partners, providing you with services during the entire lifecycle of our chillers.

Whether for pre-sales consulting, technical support, maintenance or after sales services, our partners will do everything to make sure that you are completely satisfied.

Presented by:



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## Over 30 Years of Pioneering Absorption



## Inspiring Vision built on Strong Tradition

Where responsibility belongs in business



## Pioneering Absorption

Over 30 Years of Experience

### History

YAZAKI is the leading global supplier of renewable absorption cooling and heating systems for commercial and private sectors today. Over the last 30 years YAZAKI has gained significant experience in developing, designing and manufacturing absorption chillers and thus pioneered the absorption cooling business in many ways – ranging from the world's first mass production of small to medium sized absorption chillers over the world's first solar powered air conditioning system to today's innovative Aroace water fired chillers.

### Milestones

- 1929** YAZAKI founded by Mr. Sadami Yazaki
- 1963** First overseas sales office opened in the USA
- 1970** Start of production of "Aroace" absorption chiller/heaters launching CH-1000 and CH-1500 (12.25 & 17.5 kW capacity)
- 1974** YAZAKI creates the world's first solar-powered air-conditioning system at Solar House 1
- 1977** YAZAKI starts production of the first Aroace water fired chillers WFC-400 and WFC-600 (4.5 & 7 kW capacity)
- 1978** YAZAKI opens the Hamamatsu factory, an ultramodern solar-powered plant, to take over all manufacturing operations
- 1980** YAZAKI Europe is established with the opening of the first European sales office in the UK
- 1991** Launch of production of low NOx emission burners
- 1995** Establishment of MAYA S.p.A., Milano, as a YAZAKI Corporation joint venture company
- 1998** Production of gas driven Super Aroace M series providing higher cooling capacities ranging from 455 to 700 kW
- 2001** Development of new water fired chiller series, the Aroace WFC-S series, featuring an unrivalled compact design and reduced start-up time
- 2006** YAZAKI Europe Limited sets up its Environment and Energy Equipment Operations (EEEE) to better support our European customers
- 2007** YAZAKI launches its new Aroace WFC-SC 5 model, featuring 17.5 kW cooling capacity for the European market  
YAZAKI Corporation receives award for excellence in family business (by IMD/Switzerland)

## YAZAKI - The Company

With over 30 years' experience in developing and manufacturing absorption chillers, YAZAKI is often referred to as 'The Pioneers of Absorption'. Drawing from our unmatched expertise in mass production of absorption chillers, it is YAZAKI'S ongoing mission to provide our customers with reliable and innovative products that will help cutting rising energy costs and improving energy efficiency.

As a truly global company deeply rooted in Japanese cultural traditions and values, YAZAKI is not only a reliable partner to its customers but also a promoter of environmental sustainability throughout the world.

### Facts & Figures

- Leader in non-CFC based central air-conditioning offering capacities from 17.5 kW to up to 700 kW
- Mass production of absorption cooling equipment since 1970
- 50 engineers exclusively dedicated to the research and development of our absorption chillers
- More than 100,000 absorption chillers installed worldwide, more than 2,000 installations in the EU
- Global cooling capacity installed exceeding 3500 MW

We thus enable our customers not only to cut energy costs but also to meet the challenges of energy efficiency laws and green building design codes.

For more information about YAZAKI, our history and our environmental responsibility please contact us or visit our website at [www.yazaki-airconditioning.com](http://www.yazaki-airconditioning.com).

## Protecting the environment – reducing energy costs

Our environmental products



## Realizing Energy Efficiency

### Innovative Technologies and Applications

#### Applications

YAZAKI provides a wide range of world-class absorption chillers that significantly reduce ever-rising energy bills, while increasing off-grid cooling efficiency. These chillers are designed for commercial applications and building projects that require chilled water for central air-conditioning systems.

Whereas regular compression cooling depends on electricity, which elevates the overall costs and energy consumption and in addition creates CO<sub>2</sub> emissions, absorption cooling can run on any kind of heat such as

- hot water
- solar thermal
- waste heat from co-generation or biomass
- waste heat from district power station or industry
- direct heat fired by gas

This makes absorption cooling an environmentally friendly and cost-saving alternative to conventional air conditioning systems.

For more information about application options, absorption cooling technology and our references please contact us or visit our website at [www.yazaki-airconditioning.com](http://www.yazaki-airconditioning.com).

#### Our Products

YAZAKI absorption chillers, using water as refrigerant, are today's best choice in air conditioning. While protecting the environment and reducing energy costs, they also cover basic cooling loads and ease electrical peak demands.

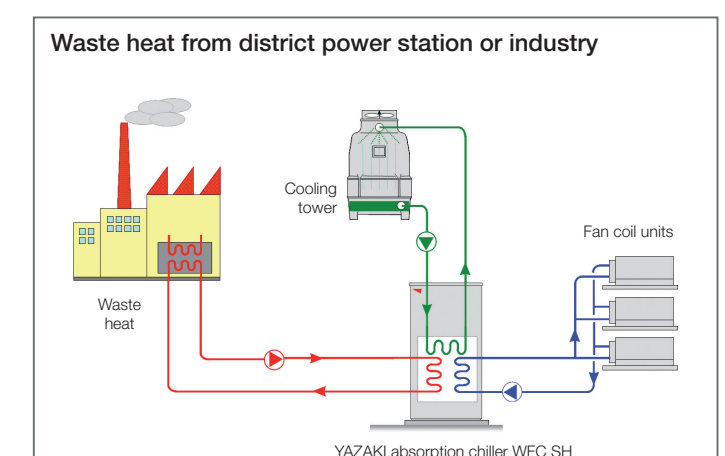
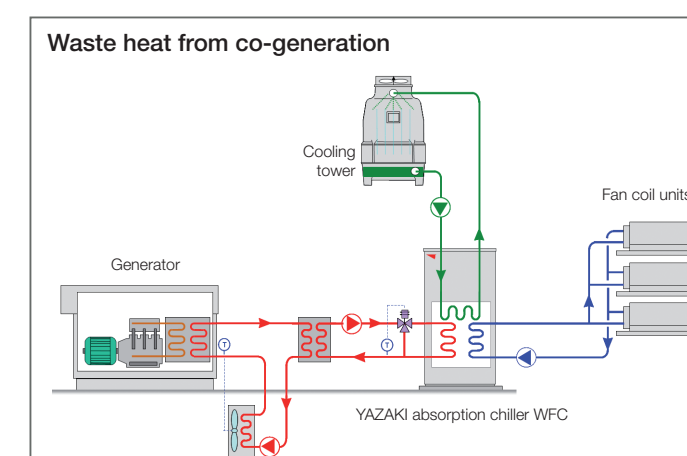
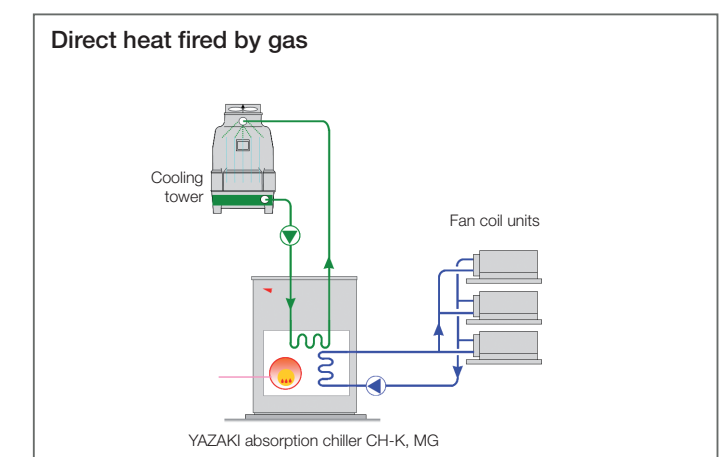
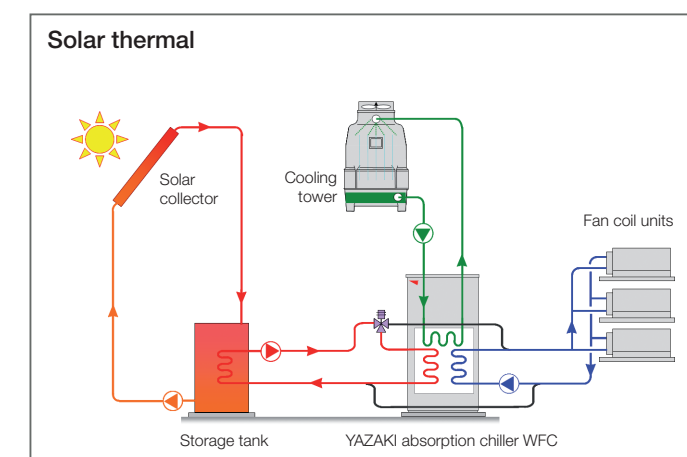
YAZAKI single-effect and double-effect chillers are offered in a wide range of capacities from 17 kW to 700 kW:

- Water-Fired Chillers (WFC-Series)
- Gas-Fired Chillers up to 700 kW (CH-Series)

They serve such diverse facilities as hotels, offices, shopping malls, residential homes, hospitals, and small businesses, bearing outstanding advantages such as:

- Reliable, durable and mature technology
- Reducing energy costs (low electrical consumption)
- Protecting the environment
- Various heat input sources possible
- Low noise, compact design, long life span

For more details about YAZAKI absorption chillers please contact us or visit our website: [www.yazaki-airconditioning.com](http://www.yazaki-airconditioning.com).



## Case study – Waste heat utilisation in a deep frying facility

Processes in the food industry often involve the use of large quantities of heat. Along with the cooling needed to cool the products, the high internal heat load induced by this high heat usage creates a considerable cooling demand in production rooms and this requirement can only be partially met by fresh air supply even during transition periods. If the use of heat in production is combined with suitable waste heat streams, an absorption chiller can often cover the base load of the cooling demand economically.

In the illustrated case, the use of YAZAKI's model WFC 30 absorption chiller was studied in a deep-frying factory. In four production lines working in 15-shift-per week operation about 15 t/h of material are first steamed in steam-heated ovens and then deep fried.

The heat needed to drive the cooling unit is drawn from the approx. 5,800-m<sup>3</sup>/h flue gas of the afterburning of the deep fryer's exhaust air. The hot combustion gas is first used to heat thermal oil and then leaves the unit at a temperature of 250 °C. With the aid of a heat exchanger, it is possible to transfer an average of 220 kW to a hot water system during the production shifts (cf. Figure 1).

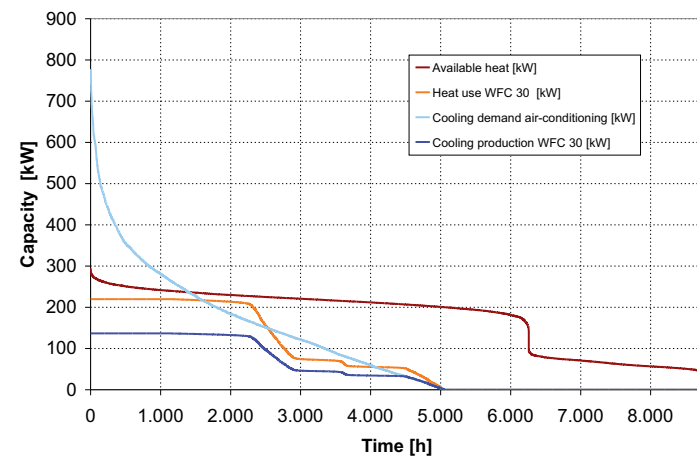


Figure 1: Ordered annual load duration curve of the waste heat supply and cooling demand for room cooling

As the case of application makes it possible to select a high drive temperature (95 °C) and a low cooling outlet temperature (27 °C), and as it provides a sufficient quantity of waste heat, the WFC 30 installation can be configured to deliver about 30% over its nominal useful cooling capacity (cf. Figure 2).

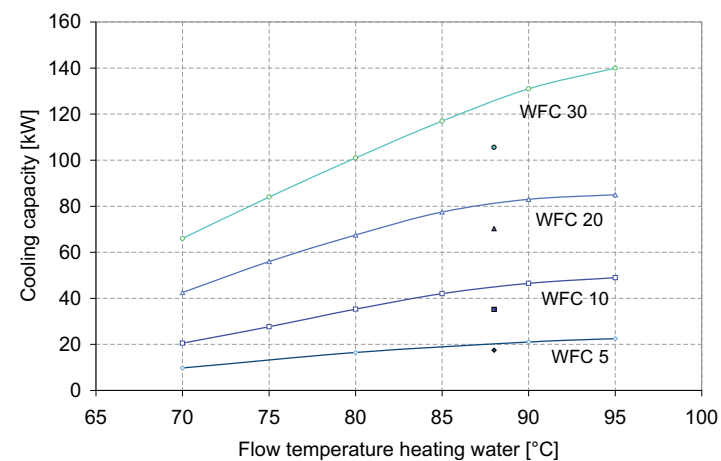


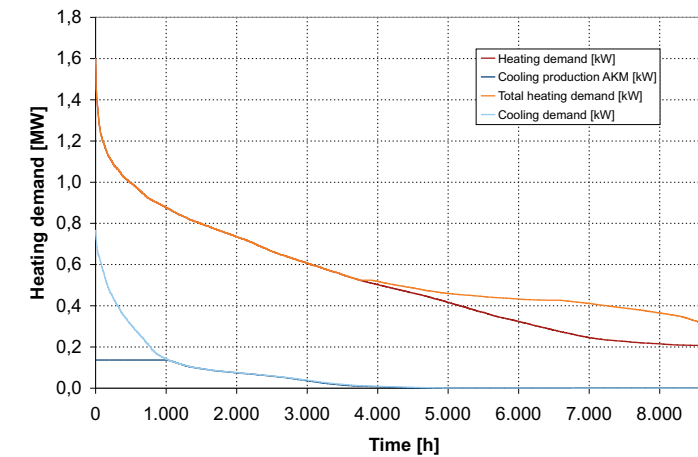
Figure 2: Nominal operating points and achievable cooling capacity at a cooling water input of 27 °C as a function of heating water input temperature.

The high heat input of approx. 800 W/m<sup>2</sup> in the steaming and deep frying hall creates a considerable cooling demand for the room air. A thermal building simulation was used to estimate a cooling demand of about 5,000 h/yr with a peak load of 780 kW (cf. annual load duration curve in Figure 1). Thanks to the high coincidence level of waste heat generation and cooling demand, the YAZAKI WFC 30 makes it possible to cover about 48% of the cooling demand with waste heat. The peak of the remaining cooling demand is cut by 136 kW.

The case studied shows that YAZAKI absorption chillers offer an attractive option for the utilisation of existing waste heat potentials. A total investment of €78,000 yields an annual operating cost advantage of €14,000 and thereby amortises itself in 6.7 years (5% interest). In addition to the financial benefit, the avoided electrical demand represents a reduction in production-related CO<sub>2</sub> emissions of about 86 tons.

## Case study – Absorption chiller installation in a hotel

The installation of a Yakazi model WFC 30 absorption chiller was found to be economical for a building air-conditioning application in a 5-star hotel. The concept considers a system being driven with waste heat from a planned biogas cogeneration unit in the vicinity. A power-heat coupling is desirable for the cogeneration unit to operate economically, as this raises the feed-in remuneration for the electricity produced by 2 euro cents/kWh (3 euro cents/kWh starting from 2009) in accordance with the German Renewable Energy Sources Act (EEG).



In this context, hotels represent ideal consumers due to their year-round heating demand, a significant share of which (up to 40%) is used to supply hot water. As a result, the cogeneration unit can be operated in this case with estimated 6,857 full load hours per year (with complete waste heat utilisation). The use of an absorption chiller to cover the basic load for the air-conditioning of the hotel rooms shifts the heating demand as shown in the diagram. This raises the number of full load hours of the waste heat utilisation by 960 h/yr and increases the annual cogeneration bonus by €15,490 per year. For the economic efficiency of the concept, the following assumptions were made:

- The investment cost of the cogeneration unit will be covered by the basic remuneration of the German Renewable Energy Act (EEG). The additional costs of the concept (bio-gas pipeline to the hotel, installation costs) can be paid back in less than 3 years through the cogeneration bonus for the heating and hot water heat demand.
- As the cogeneration unit is operated year-round at the hotel, the use of the absorption chiller incurs no additional operating costs for the cogeneration unit – no additional sales revenues are required for heat output in the summer.

Hotel:	<ul style="list-style-type: none"> <li>• 530 rooms, gross floor area 36,000 m<sup>2</sup></li> <li>• Cooling supply via 3 vapour-compression refrigeration units totaling 700 kW, COP<sub>veru</sub> = 3</li> </ul>
Cogeneration unit:	<ul style="list-style-type: none"> <li>• 537 kW<sub>el</sub>, 524 kW<sub>th</sub> (η<sub>ges</sub>=0.79)</li> </ul>
Absorption chiller (WFC 30):	<ul style="list-style-type: none"> <li>• Cooling capacity at design: 127 kW</li> <li>• Peak load covered by existing vapour-compression refrigeration unit</li> <li>• Interest rate 5%</li> <li>• Electricity unit price €0.12/kWh, demand charge €100/kW</li> <li>• Water €2.50/m<sup>3</sup></li> </ul>

As the maximum electrical consumption of the hotel in the summer results from the cooling, the hotel can also be charged a corresponding share of the demand charge. Given these initial conditions, the hotel operator achieves an amortisation period of 4.7 years for the total investment of approximately €63K required for the absorption chiller and the expansion of the cooling towers. The operating cost benefit does not take into account the additional revenues from the increased cogeneration bonus totalling €15,490 per annum.

The specific example shows that there are most attractive situations that favor the use of absorption chillers. A short amortisation period can even be achieved for a subsequent installation if a low price per kWh for the driving heat is available. In the case of a new investment directly compared versus an alternative investment in a vapour-compression refrigeration unit, the benefit is even greater.

Dimension	Absorption chiller	Vapour-compression refrigeration unit	Difference
Maintenance / repairs	1.763 €/a	1.500 €/a	+ 263 €/a
Electricity costs	278 €/a	12.100 €/a	- 11.822 €/a
Demand charge Electricity	50 €/a	4.233 €/a	- 4.183 €/a
Water costs Cooling			+ 513 €/a
<b>Cost benefit absorption chiller</b>			<b>15.229 €/a</b>