HAASE TANK GMBH

HOTWATERTANK

Clean and economical energy storage system for hot and chilled water

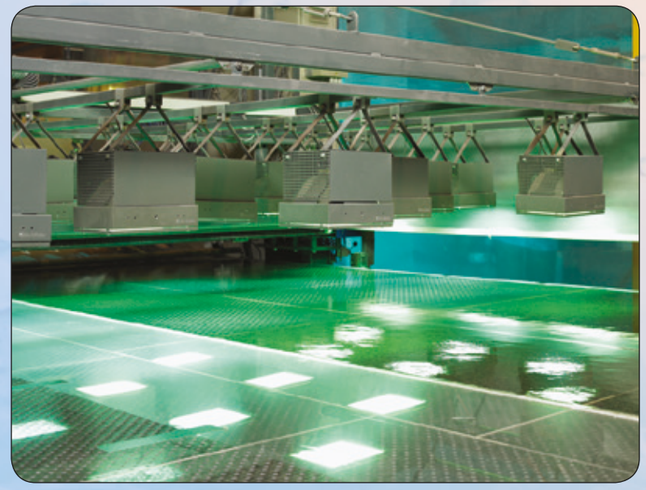
Manufactured in Germany

Made in Germany:

The original Haase hot water tank - permanently stable, permanently tight

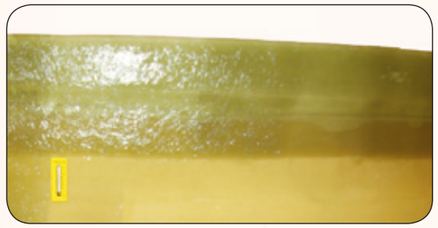
- Development and experience for over 50 years in Fibreglass technology
- Long term experienced specialist ensuring highest quality output
- Additionaly, completely sealed tanks for outdoor usage
- Automated, computer controlled production and assembly to ensure constant quality and conformaty

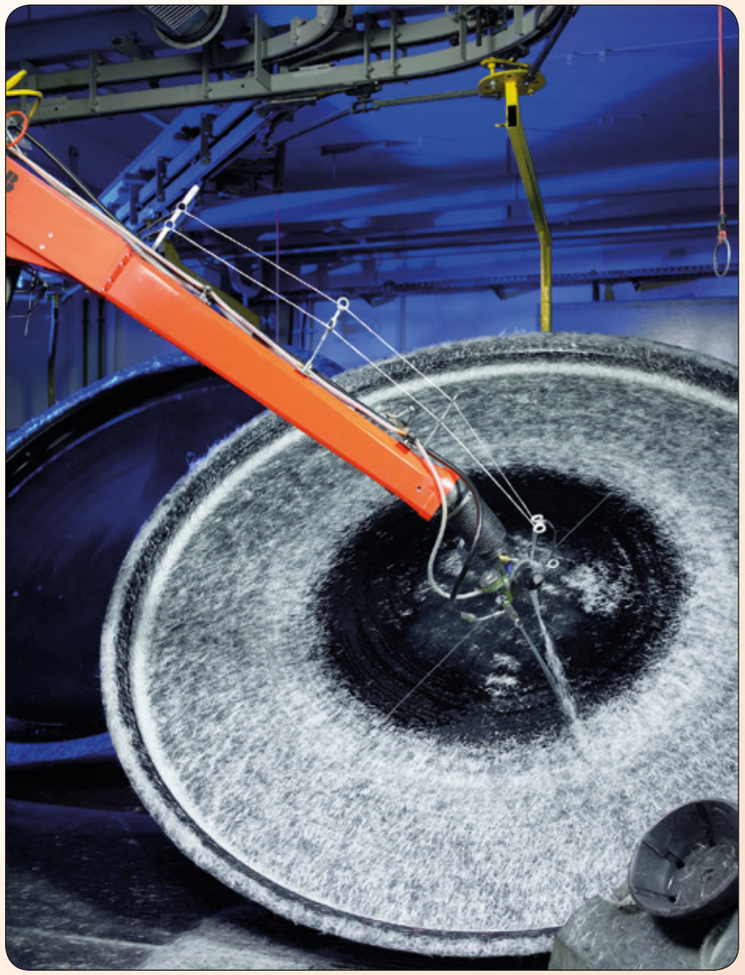
- Internal heat exchanger (stainless steel 1.4404 acc. 316 L - Made in Germany)
- Advanced wall connection system resulting in more efficient heat transmission

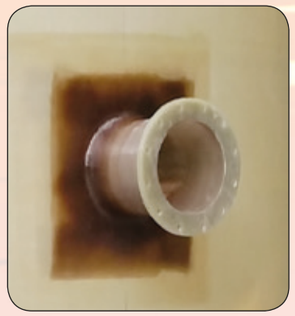


- Controlled lamination curing process which ensures even and time controlled fabrication
- High temperature resistant fibreglass materials, especially developed in co-operation with chemical manufacturer, which is mainly available in Germany

- Re-inforced bottom and lid components resulting in added safety in key areas







- Technical development to strengthen key areas such as high pressure point on joining materials

The Haase hot water tank

Heat transfer technology

One of the main advantages of our indirect system is the elimination of an additional heat exchanger for primary heat sources. This design results in a much more efficient heat transfer, especially in the low temperature range such as heat pump application. A recent study, using the same primary heat source, operating once with a separate heat exchanger and then direct, without the use of a heat exchanger, resulted in an increase of temperature supply in the hot water.

In addition we utilise this principle for multiple heat sources, which can operate simultaniously. An example is the use of solar, heat recovery and boiler, all at once, utilising the surplus energy, when available, at the same time calling on the boiler to supply the top up energy, if needed. We have many of these systems in operation and actual experiance in this field for over 20 years, covering the area from Hawaii to the Phillipines.

Some of the outstanding advantages of the Haase hot water tank are:

- First in - first out principle on hot water ensures no mixing of stale water
- Non metallic inner and outer container
- Non pressurized container
- Low heat loss
- Individual design to adapt to individual projects
- Resistant up to 95 °C
- Built on-site for easy access
- Stainless corrugated heat exchanger
- Multiple heat sources
- Multiple pressure zones for secondary water
- Dedicated insulation system which results in conform shielding and offering minimum heat loss

The principle

Haase hot water tanks consist of an inner tank of high-quality GRP (glass fibre reinforced plastics) and a thermal insulation that it is in turn protected to the outside by a GRP wall. Depending on the needs the Haase hot water tank is provided with internal corrugated stainless steel heat exchangers or prepared with flanges for external heat exchangers.

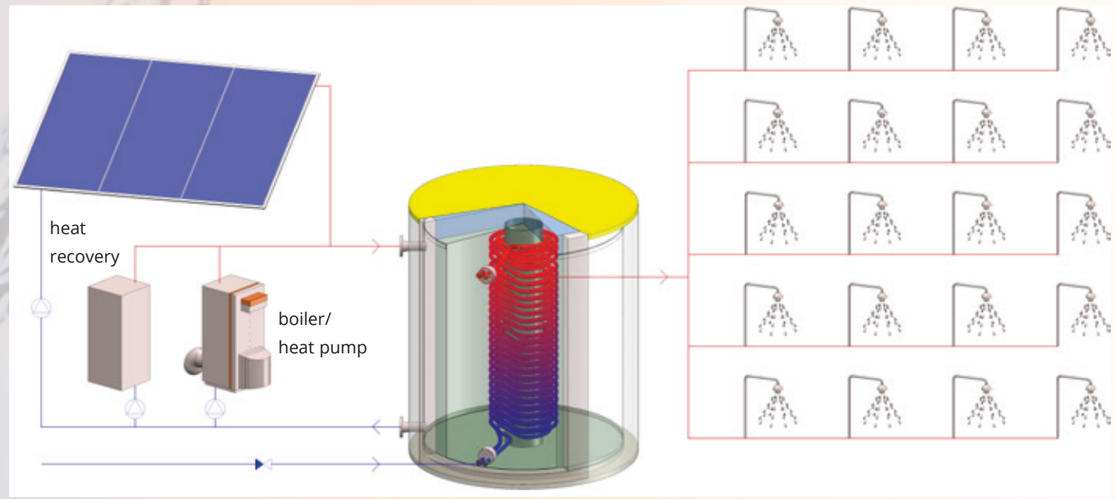
Specifications of the Haase hot water tank

Specific feature: on-site assembling possibly
Storage medium: water
Max. temperature: 95 °C
Max. pressure of the energy tank: only unpressurized operation possible
loading and unloading system:
- internal high-grade steel corrugated pipes (1 1/2" flat sealing, max. 6 bar)
- stratification loading and unloading system (with external heat exchangers)
- flanges (with external heat exchangers)

Thermal conductivity of used materials

Material	Usage	Thermal conductivity in [W/(m*K)]
Mineral wool	Cover and wall insulation	0,040
Styrodur	Bottom insulation	0,034
High-grade steel	Heat exchangers	15,000
Glass fibre reinforced plastics	Tank material	0,197
For comparison: steel	Tank material (other producers)	48 to 58

Example of how a Haase hot water tank can be tied into a system



Small enough to fit through doorways - big in the basement

The Haase hot water tank is delivered in individual components and assembled on-site. Narrow doors or stairs are no longer a problem, thanks also the light weight of GRP.

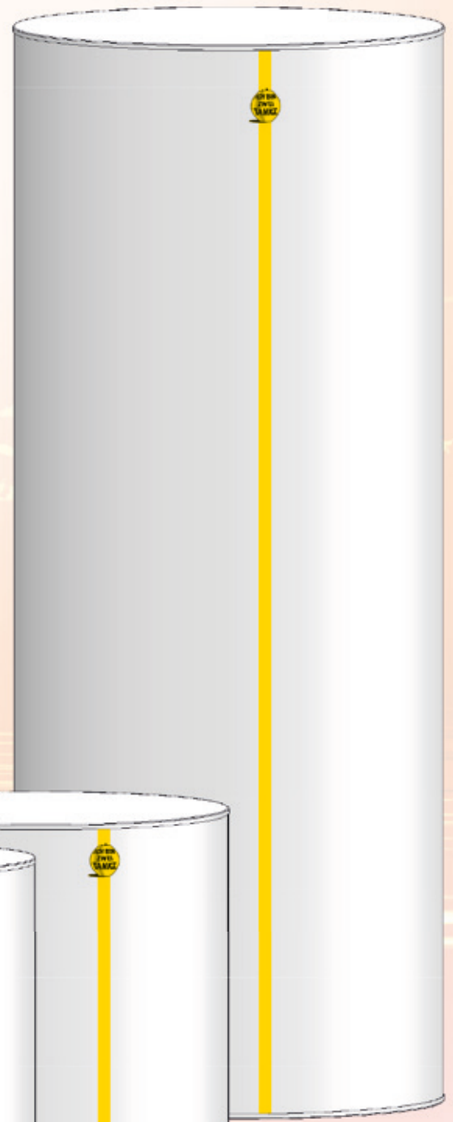
Broad application range:

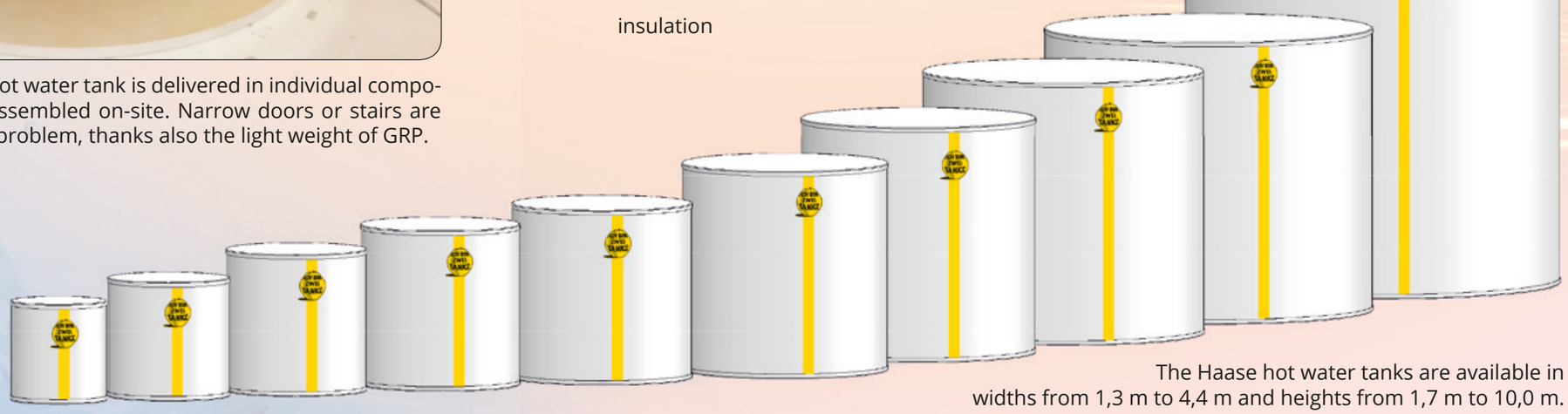
The variable design of the Haase hot water tank enables a number of applications. The thermal energy can come from diverse sources (solar systems, solid fuel boilers, oil or gas boilers, waste heat, heat pumps, etc.), be stored, and the tank can also be used as a cold storage unit.
The charging and discharging can be via flanges, internal heat exchangers or a stratification system.

The material glass fibre reinforced plastic (GRP)

Due to the combination of various source materials, GRP offers outstanding properties and is therefore used for a number of applications. GRP provides the following properties:

- corrosion resistance
- ageing resistance, weather resistance
- low specific weight while maintaining high mechanical characteristic values
- temperature resistance
- GRP can be subsequently modified according to individual requirements, e.g. laminating of flanges
- low thermal conductivity and high thermal insulation





The Haase hot water tanks are available in widths from 1,3 m to 4,4 m and heights from 1,7 m to 10,0 m.

Reference:

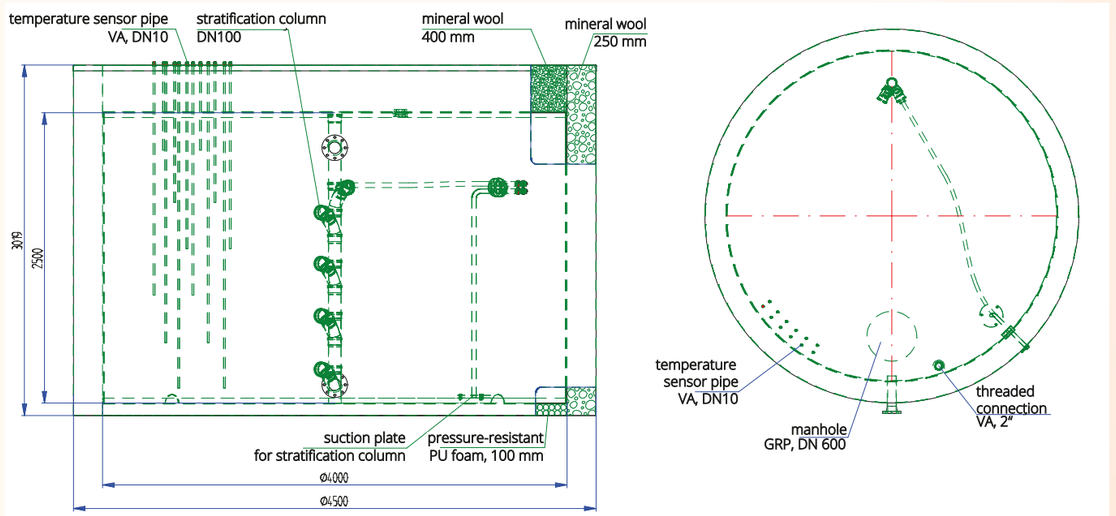
500,000 kWh / year energy saving: Main showering complex (Hamburg, Germany)

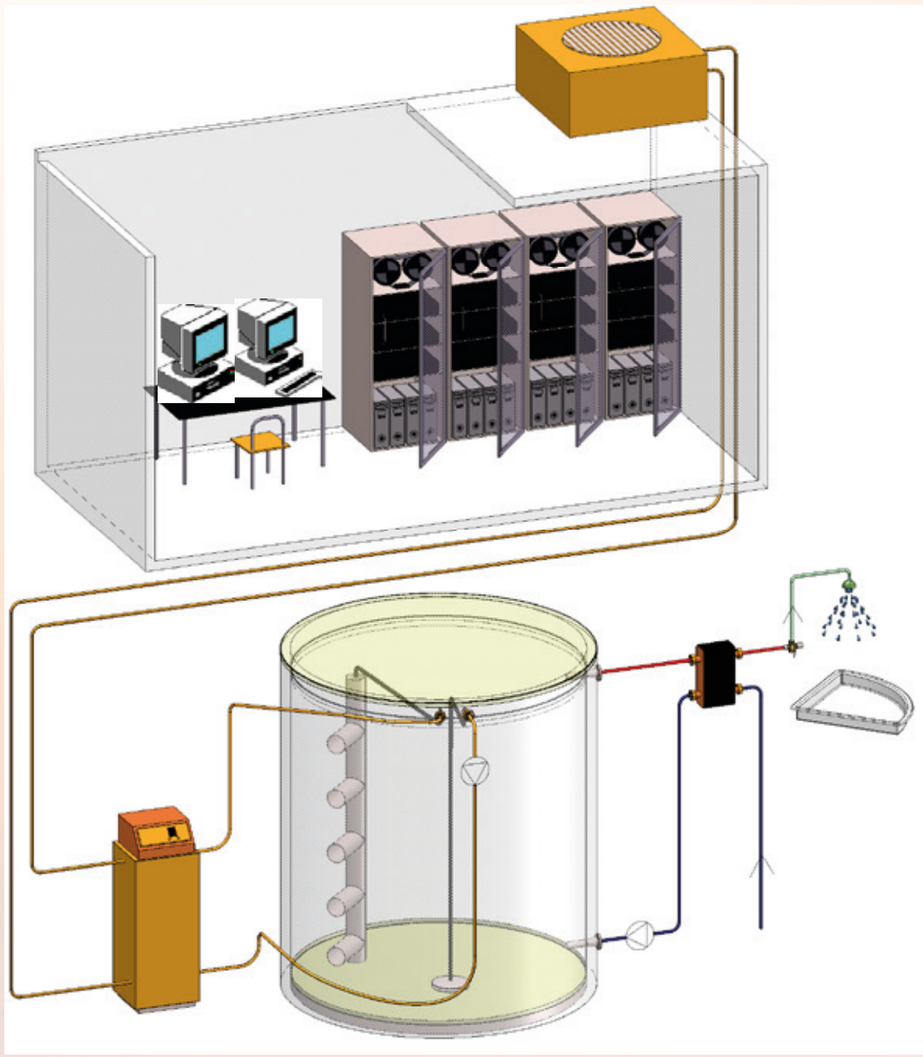
The project

This system was designed to utilize the waste heat from the computer room cooling system and has been in use for over 5 years.

The council server rooms need to be at a stable cool temperature, which involves the removal of heat generated by the computers. Traditionally water/air systems are used for this practice, resulting in the compulsion of heat created during this process.

Mr. Iskenius-Eggers, chief engineer at the council designed, proposed and implemented a water/water heat pump, in conjunction with an energy storage tank and integrated piping to accumulate this surplus heat. The centre of this system is a 35 kW heat pump supplying 15-degree cold water for the computer room cooling system and the waste heat of approximately 62 degree that is accumulated in our Haase tank. Initially a 10 year payback was calculated, but the estimated payback for the implementation of our heat recovery tank, including connection to the heat pump, was less than one year, offering now yearly cost savings of around Euro 70,000.00.
The energy is built up in our Haase tank over some 20 hours and used to supply ample hot water for the showering when the workers return from their work, in the afternoon.





Main showering complex for 500 workers at the council headquarters in Hamburg

Heat accumulation system:

Haase 30,000 l stratification storage

Estimated hot water use:
25,000 l / day

Energy saving:
500,000 kWh / year

Reference:

25,000 kWh / day heat recovery system: commercial use of hot water (Berlin, Germany)

The project

This system was designed to accumulate wasted heat for re-use.
Daily close to 450,000l of hot water are commercially used as well as heating support for the floor heating system.

Our tank has been designed to enable the use and storage of surplus heat from various heat sources. The key is our stratai-fication device which ensures that the highest tempderature is accumulated in the top of our tank. The surplus energy is then removed from this hottest locati-on and supplies hot water for processing as well as supporting the floor heating system.

Surplus heat is accumulated from the following devices:

- 4,000 kW boiler (gas)
- 2 air compressors (waste heat 65 °C)
- Temperated wastewater separate system which accu-mulates the hot waste water. The hot waste water is then used to pre-heat the incoming cold via a cross flow heat excha-nager

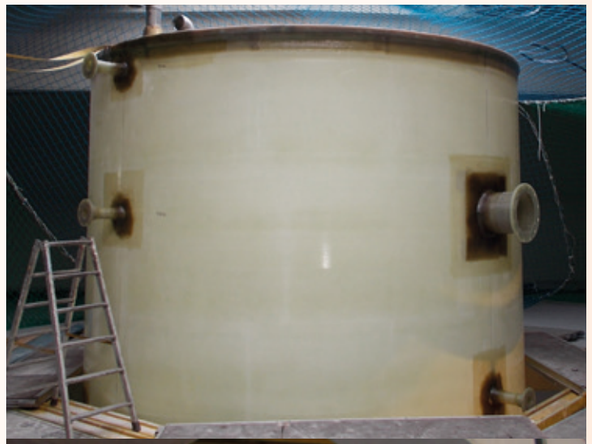
Recovered heat calculation estimate:

450,000 l day from 10 to 55 Deg C
= 23,500 kWh

Heating support for floor heating
= 1,500 kWh

Recovered heat total
<u>= 25,000 kWh</u>

Our 79,000 l tank is 6.8 m high and covers two floors



Reference:

Energy recovery 150,000 kWh a year (Hamburg, Germany)

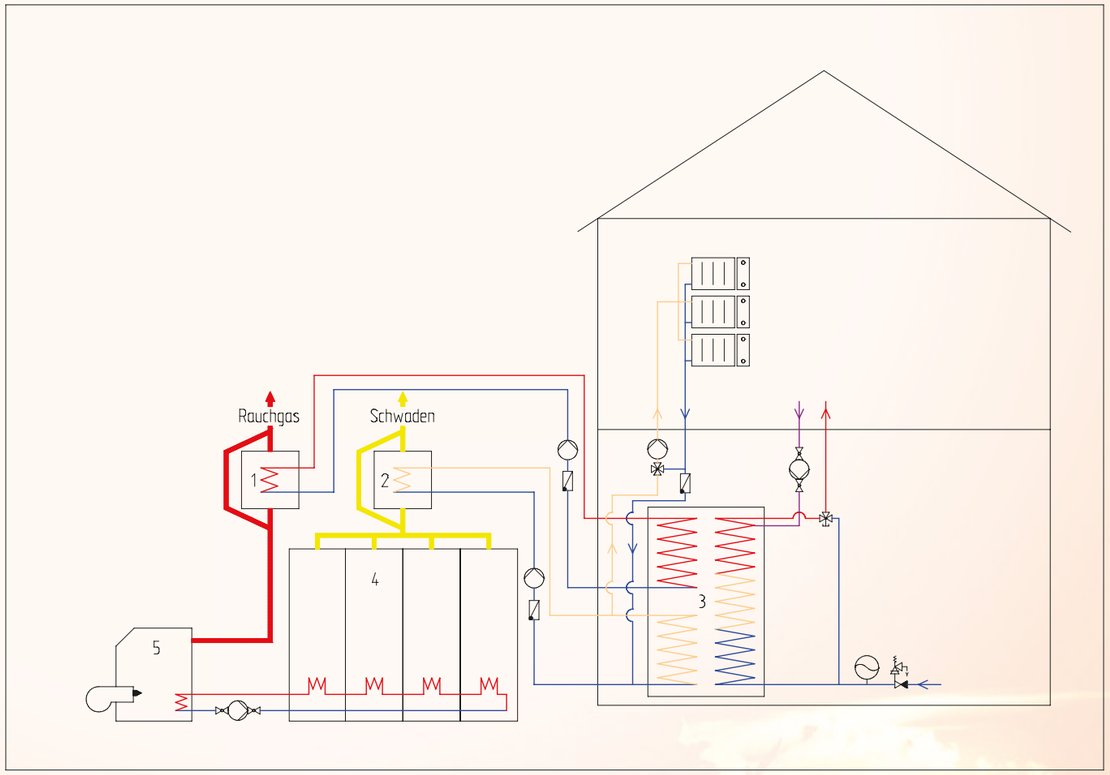
The project

An established bakery in Hamburg wanted to optimise the wasted heat from their baking ovens and boilers. The bakery is part of an old established building occupying the ground floor and basement in this multy storey building. Together with our Haase partner in Hamburg they came up with a solution to optimise this wasted energy by using our tank as a heat accumulator and utilise this heat to supply hot water as well as space heating to the 12 flats in the same building. The bakery is able to charge the useres for this energy with an estimated return of investment of 3 years.

The great challange was the implementation of all the required components. This was a rather difficult challenge since there was no additional space available. However there was some space under the basement of the bakery which was really the only solution.
This space, under the bakery , was excavated so that we could fit the three tanks (2 x 8,000 l plus 1 x 6,050 l). After the space issue came the access issue. This newly created space below the bakery was only accessible via a 70 x 70 cm floor opening (shown in the picture). This of course was no issue for our tanks, since this is one of our advantages. All components were passed through this floor opening and our skilled partner had no problems to construct these tanks in this rather unique location.

Investment has been returned many times

The skills and understanding of our Haase partner made this project a real succes. During a recent visit, at the bakery, we had the opportunity to meet with the owners of the bakery. They expressed that this was the best innovative and money making project and they thanked us for coming up and realizing this projekt. This system is in operation now since 2011 and it will operate for many more years to come.



Our three tanks were constructed in this limited space available.

Technical details

2 x T 422-77
Volume: 8,000 l
Height: 2.50 m
Diameter: 2.50 m

1 x T 419-58
Volume: 6,050 l
Height: 2.50 m
Diameter: 2.20 m
assembled on site

Configuration:
Heat exchangers for primary and secondary heat transfer

Application:
- Domestic hot water
- Heating support

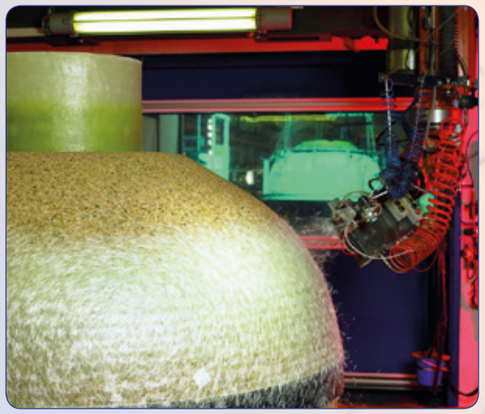
Heat sources:
- Exhaust heat from ovens, about 62 kW
- Flue heat recovery from boiler, about 37 kW

The Haase company

Haase was initially established in 1961 and developed the revolutionary oil storage tank, introducing a completely new concept in oil storage. This product is known for changing the market and is still sold nowadays, with many tens of thousands installed tanks.

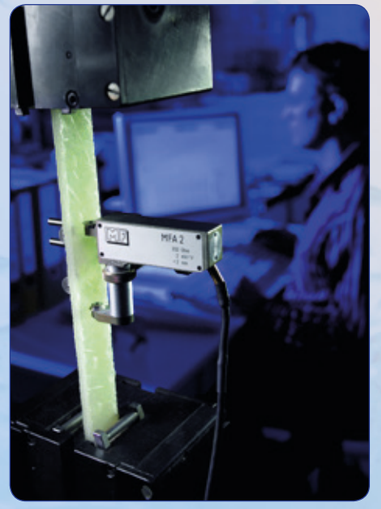
Mr. Harry Haase, the owner and founder of the company, is a pioneer in fibre glass tanks, constructing storage tanks up to 1.500.000 l. He designed and built state of the art manufacturing machines giving us the lead in this type of industry.

Our Haase team consists of a group of dedicated members with many years of experience. In our last 50 years of operation more than 200,000 tanks have been manufactured which shows our competence and innovation in the field of tank construction.

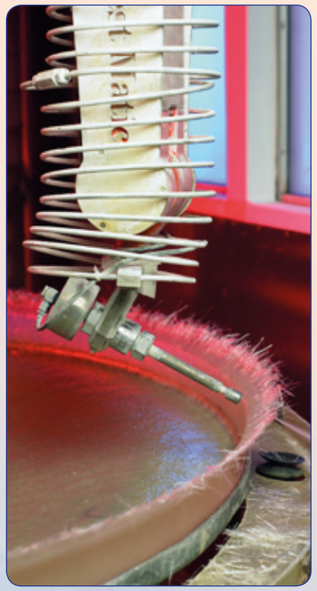


The basic material used is glass fibre reinforced plastic and due to our inhouse technology and developments we are able to introduce most efficient and reliable products. One of these products is our Haase hot water tank. This tank offers all the advantages that come with non metal tanks, such as low energy losses, no corrosion and ease of handling.

Our factory is located near Dresden where we utilise the latest technology to manufacture our tanks from raw materials. We developed and built the sheet manufacturing plant inhouse which makes us completely independent, allowing us to quickly adapt to individual requirements. Our selection of raw materials is very strict and we only use high quality components from reputable companies. Our continious quality assurance procedure ensures the highest standard of our finished products.



Haase products are sold and installed around the world. Together with our local partners we can provide the right product for the individual project. Our Haase hot water tank is mostly used in the field of hot water, as well a chilled water due to the low energy loss and non corrosive behaviour.



Haase hot water tanks references (international, selected)

Project	Location	Country	No	Tank type	Litres	Install.
Dairy	Steiermark	Austria	1	T 630-441	44.100	Mar 10
City Hall	Chesterfield	USA	1	T 440-293	30.300	Sep 10
University	Washington D.C.	USA	1 1	T 425-115 T 430-216	11.500 22.600	Aug 11
Point Loma Nazarene Univ.	San Diego	USA	1	T 417-37	3.520	Oct 11
Lori	Limache	Chile	1	T 415-21	2.050	Oct 11
Hotel Intercontinental	San Salvador	El Salvador	1	T 422-59	5.900	Feb 12
Island Hospital	Penang	Malaysia	2	T 422-77	8.000	Dec 12
Facebook	San Francisco	USA	1	T 422-77	8.000	Dec 12
Ramada Hotel	Melaka	Malaysia	3	T 417-33	3.000	Feb 13
Discovery Primea	Makati City	Philippines	2	T 422-77	8.000	Apr 13
Hotel Dusit	Manila	Philippines	2	T 422-77	8.000	May 13
Ramada Hotel	Melaka	Malaysia	2	T 422-77	8.000	May 13
Holiday Inn	Singapore	Singapore	2 2	T 419-58 T 417-37	6.050 3.520	Jun 13
Shangri-La	Bali	Indonesia	1 1	T 415-36 T 417-48	3.700 4.750	Jul 13
Hostel Project	Dubai	UAE	1	T 422-77	8.000	Aug 13
Uda Hotel	Kuantan	Malaysia	2	T 417-48	4.750	Dec 12
Hotel Suriah Sabah	Kota Kinabalu	Malaysia	2	T 422-87	9.100	Mar 14
Riverson Hotel	Kota Kinabalu	Malaysia	2	T 417-55	5.400	Jun 14
Autonomno	Moscow	Russia	1	T 440-387	40.000	Jun 14
Terminal Palawan	Melaka	Malaysia	2	T 415-28	2.750	Aug 14
Sportcenter	Barcelona	Spain	1	T 410-13	1.100	Aug 14
Highest Hotel	Melaka	Malaysia	2	T 417-48	4.750	Aug 14
Cititel	Ipoh	Malaysia	2	T 417-48	4.750	Nov 14
Jazz Hotel	Penang	Malaysia	1	T 417-48	4.750	Jan 15
Mesa College	San Diego	USA	1	T 425-115	11.500	Mar 15
Fairway City Hotel	Colombo	Sri Lanka	1	T 419-50	5.000	Oct 15
West Street	New York	USA	7	T 415-21 - T419-45	2.050 - 4.500	Nov 15
Hawaii 2	Honolulu	USA	1 2	T 430-216 T 422-105	22.600 11.000	Nov 15
Nanyang Technological University (NTU)	Singapore	Singapore	6 6	T 417-48 T 417-33	4.750 3.000	Dec 15
Holiday Apartments	Hawaii	USA	2	T 417-40	4.000	Dec 15
Palm Project	Dubai	UAE	2	T422-77	8.000	Dec 15
City Lodge Hotel	Cape Town	South Africa	1 1	T 419-87 T 419-87	9.200	May 16 Aug 16
Pianeta Calore	Lauria	Italia	1	T 417-48	4.750	May 16
various	Borocay/Cebu	Philippines	8	T 413-22	2.050	Jul 16
Bronx	New York	USA	1	T 425-86	8.650	Sep 16
Via Speranza	Castel di Casio	Italia	1	T 415-28	2.750	Sep 16
Nanyang Technological University (NTU)	Singapore	Singapore	6 2	T 419-50 T 419-58	5.050 6.050	Sep 16
Gallery Hotel	Singapore	Singapore	2	T 419-50	5.050	Sep 16
Fairmont Hotel	Abu Dhabi	UAE	1 4	T 440-387 T 430-216	40.000 22.600	2017

Installation sites of Haase tanks

Haase Tank GmbH Adolphstr. 62 01900 Großröhrsdorf Phone: +49 (0)3 59 52/3 55-0 info@haasetank.de

www.haasetank.de