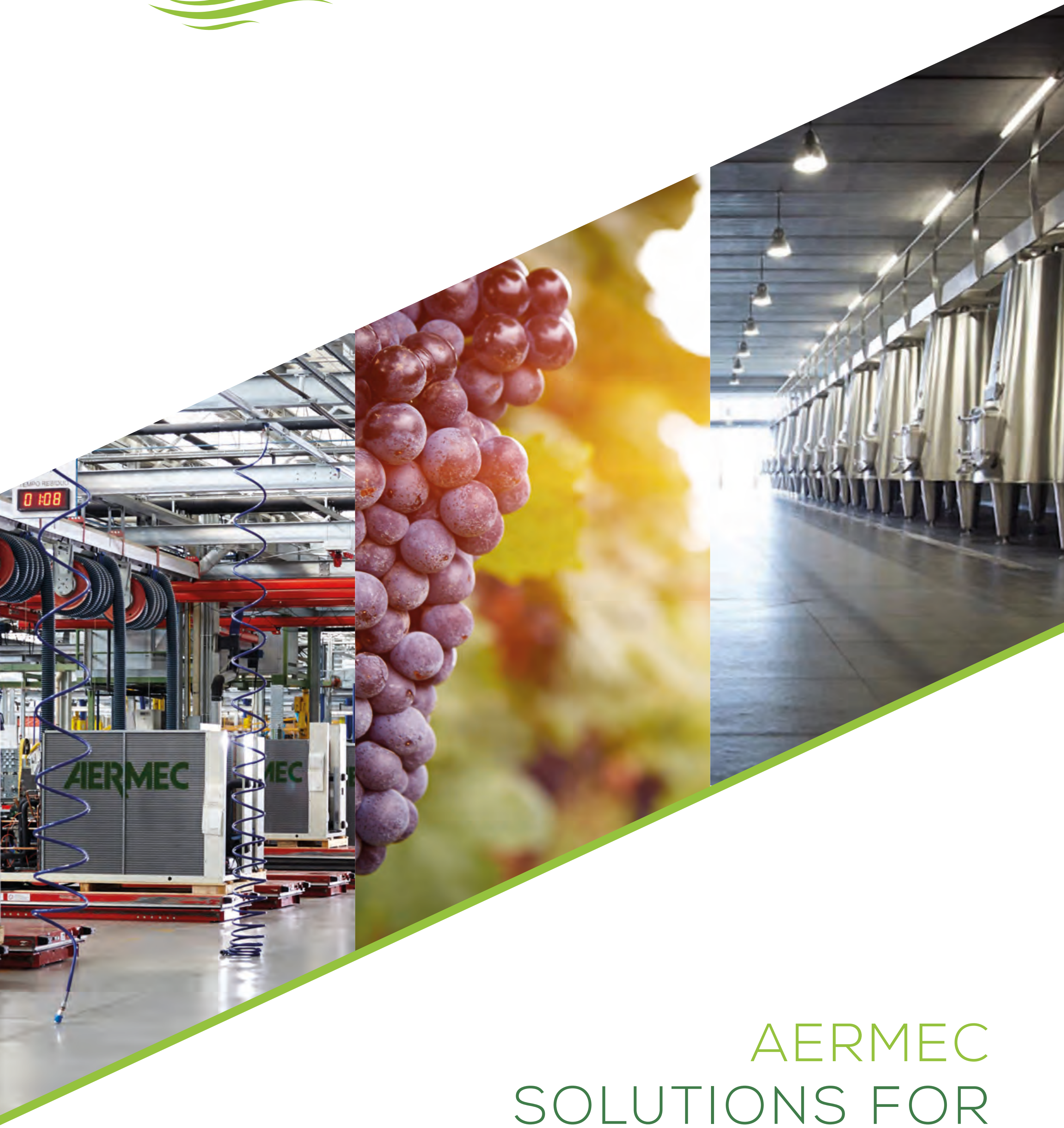

AERMEC
SOLUTIONS FOR BEST IN INDUSTRY VITICULTURE

Life quality and well-being go also through a good glass of wine.

Since ancient times, wine has represented an element that has accompanied the most important moments of our life: from toasting the birth of a child, to toasting a wedding, the beginning of the new year, victories, successes and life goals.

Wine is all this: a choice of pleasure, a lifestyle, a cultural experience.

Aermec, a leading company in air-conditioning that has always had as its objective the well-being in the rooms, has decided to make available its skills to the agricultural and food sector, the oenological sector in particular.

Over the years, Aermec's know-how in this sector has grown a lot and has allowed proposing state-of-the-art solutions.
For this reason, at Aermec, we are driven to make the idea of my father, Giordano Riello, become increasingly more strategic and help to start initiatives that make our competitive effort a winner, even in this market, for us almost unexplored.

With this publication, we wish to share what we have made, to make that nectar that we all appreciate even better.

Alessandro Riello
Aermec S.p.A. Chairman

AERMEC
SOLUTIONS FOR BEST IN INDUSTRY VITICULTURE

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1.0 Aermec's reality

Assembly line of medium capacity units

320 Millions of turnover

8 Production plants

1700 Employees

6 Foreign subsidiaries

+60 Dealers in Italy

+80 Technical After-sales Service

+70 International dealers

Founded in 1961 by Giordano Riello, Aermec is considered the **first producer of air-conditioning machines in Europe**. It quickly expanded its know-how towards new applications, among which process cooling and vinification process checking.

With the "Aermec for wine" division, born from a brilliant idea of its founder, Aermec plays nowadays a leading role in the world in **oenological applications**: important companies in the sector, and many among the most famous wineries in the world, choose Aermec to meet the demands of a modern technological vinification process. The GRIG Group, which also includes Aermec, boasts a turnover of over €320 million, combines 6 Centres of excellence, over 1700 employees, 8 production plants and distributes its products under six different brands and a widespread sales network present all over the world. With 6 companies either subsidiaries or affiliated companies, with over 60 dealers and 80 after-sales services in Italy, and over 70 international dealers, Aermec guarantees **global cover with consultancy and service offered to all types of customers**.

Aermec attaches great importance to supporting its customers in all the countries where it does business and offers dedicated technical service, with **specialized personnel** ready to intervene at any time.
All authorized service centres - 80 in Italy - are constantly updated about the most recent solutions and technologies adopted by Aermec. Thanks to widespread local presence and advanced supply and distribution logistics, Aermec succeeds in **managing and quickly guaranteeing the support and supply of spare parts all over the world**.

Advanced logistics

Highly automated production lines combined with the most advanced technologies in the logistic field, Enterprise Resource Planning (ERP) included, ensure **quick lead times** that meet customers' every need, guaranteeing **high quality levels**. In fact, before being introduced onto the market, each unit undergoes **rigorous checks about its safety and technical performance**.

In support of efficiency

Aermec has ISO 14001 certification and is strongly committed to **minimize the environmental impact** in all its activities: not only in its own plants but also in the solutions it offers its customers. Thanks to state-of-the-art development, technologies allowing the use of freecooling and advanced control algorithms, Aermec products **guarantee minimum consumption and high energy savings** both with full and partial loads.

Technology and reliability

Inside its own research centre, Aermec currently boasts **the largest calorimetric cell in Europe** for plant machinery, used to perform testing on chillers and heat pumps up to 1500 kW choosen by Eurovent for the certification, capable of testing power units up to 2 MW. Here tests are carried out with a ±0.2°C precision level, capable of simulating ambient temperature conditions going from -20 to +55°C.

Moreover, the Aermec laboratories are structured so that they carry out **tests to check noise**, as well as aeraulic and enthalpy tests. Aermec quality is guaranteed by important certifications, such as Eurovent in Europe, AHRI in North America, and many more. Many customers visit the head office every year to witness customized tests in laboratories dedicated to these operations. Rigorous procedures during the design stage, accurate suppliers' selection, in-depth tests on prototypes, numerous checks on the field and vibration analyses ensure that all Aermec products are resistant and guarantee **operation even in the most difficult work conditions**.

View from above of the factory and main entrance

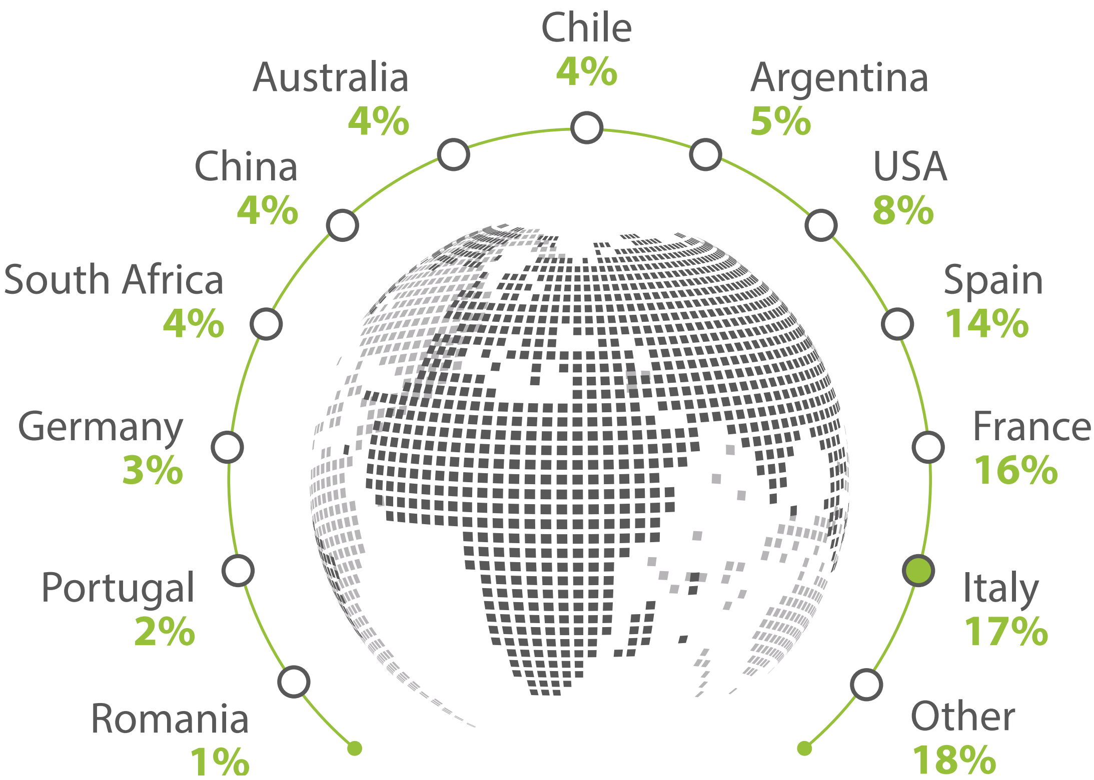
2.0 The world of wine

With a production approaching 50 million hectolitres a year, **France and Italy are the main wine producers in the world**, with a market share fluctuating between 16% and 18%. Spain, USA and Argentina follow.

A positive trend of the so-called "New World" is also recorded: Australia, New Zealand, Chile and South Africa are growing their own "**international vine varieties**", that is those that reproduce wine productions of "known" tastes, appreciated all over the world.

Currently, demand is moving towards **medium-high quality** products in all countries, quality intended as technology applied to wine production, which is more and more often a priority for both producer and consumer.
This evolution "**from quantity to quality**" is at the basis of the success of the "New World" wines and is starting to be adopted in Europe too. Italy is particularly interested in the evolution of wine markets and occupies a position on the world stage that commands respect: largest producer, largest exporter as to quantity and second exporter as to value. In recent years, the sector is abandoning its mainly agricultural connotation and presents itself increasingly more often as an **important industry, characterized by high levels of competitiveness and technology**.

On a global level, the wine sector is looking for constant improvement, which is pushing producers **to optimize the production process, adopting cutting-edge technical and management solutions**.



2015 production data

Barrique cellar
Château Cheval Blanc in France

2.1 The Italian market

In Italy there are about **300,000 wineries**, diversified into various types according to size and production type:

● **Wine farm**: it processes the grapes produced by the farm itself. It can deal with just the wine-making and sell the wine in bulk, or can carry out the whole production cycle, selling the finished product in bottles.

● **Cooperative winery**: it processes various types of grapes, supplied in considerable quantities by members, coming from a certain area that can include various communes.

● **Winery for special wines**: this is the winery that has reached maximum specialization in the production of just one type of product.

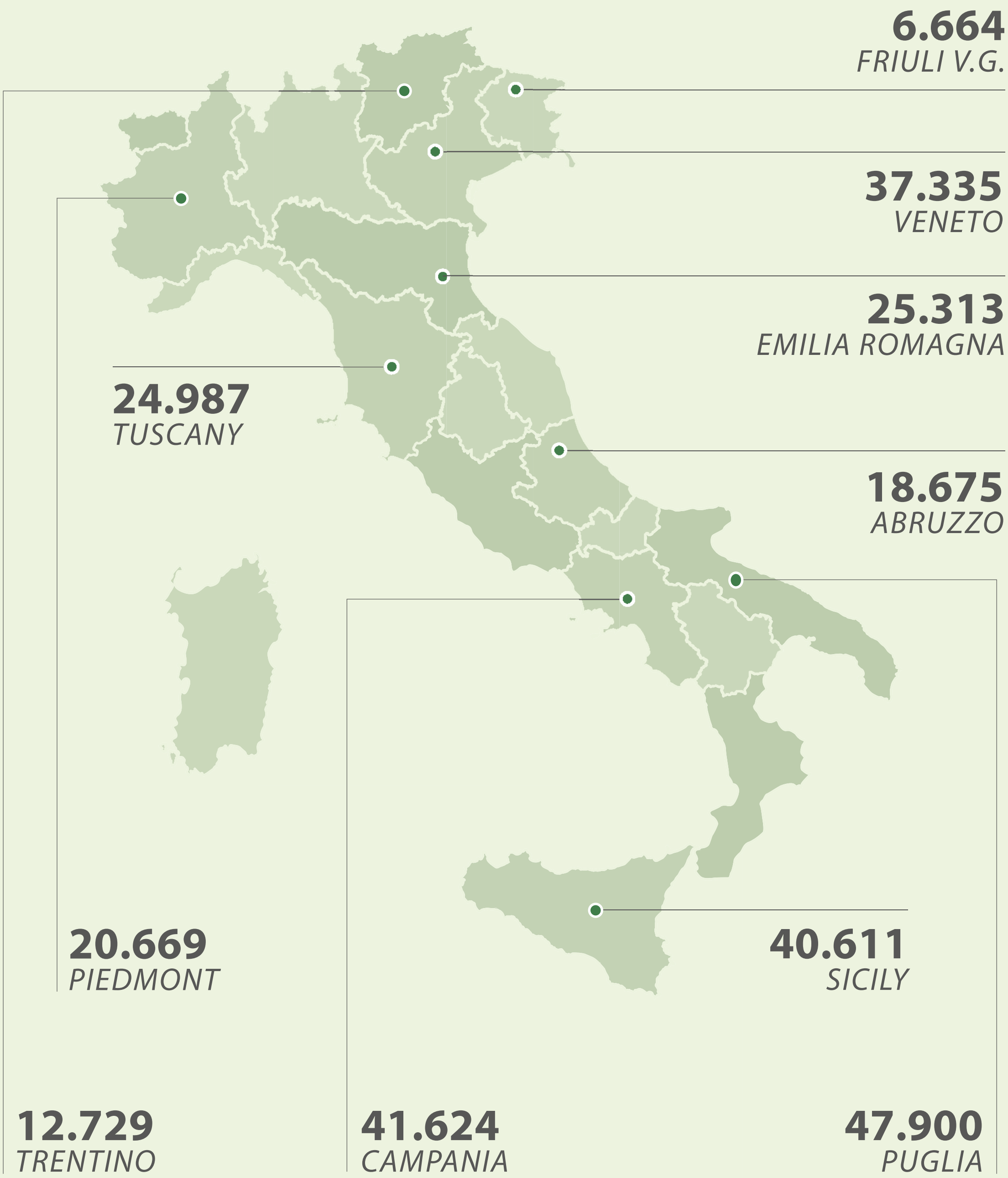
● **Bottling winery**: it is the plant that processes, finishes and bottles a product only for third parties.

The Region boasting the highest quantity produced is **Veneto**, followed by Puglia and Emilia Romagna. If, on the other hand, we are talking quality and we analyse wine production with denomination of origin (DOC and DOCG wines), Piedmont, Trentino Alto Adige and Friuli Venezia Giulia, in that order, are the Italian regions with the highest production percentage of quality wines.

Italy is currently experiencing l**ower wine consumption but a greater trend to wine tasting than in the past**. This is pushing the market towards the creation of an integrated production and distribution system, capable of guaranteeing excellence at every stage, from grape production to a production cycle controlled by specially designed and not just adapted systems and machines

Wineries per Italian region

Data updated to 2014

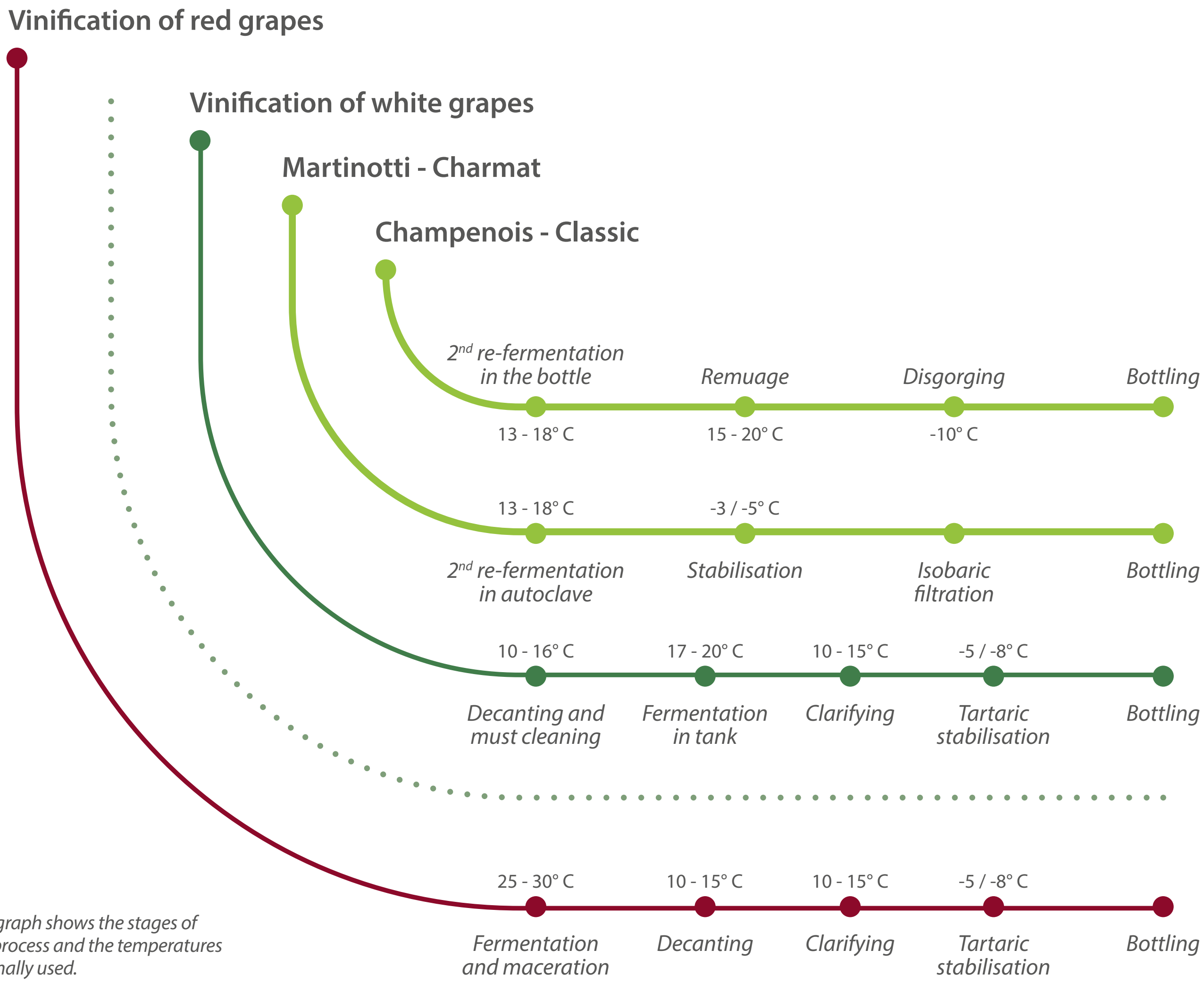


3.0 The wine chain and wine-making cycle

The **temperature variable** and its control play a vital part in the wine-making technological process and in the transformation of must into wine. The optimal temperature value to aim for and maintain varies according to the wine-making process, its various phases and the oenologist's choices. In general, it is possible to identify two operating cycles: **vinification of red grapes** (red wines) and **vinification of white grapes** (white and rosé wines).

The main difference between the two cycles is, in the vinification of red grapes, **maintaining the skins in contact with the must** to give the product aroma and colour through maceration. On the other hand, in the vinification of white grapes, **a soft pressing is carried out immediately** to prevent the must from being contaminated by other elements.
This second type of vinification applies to sparkling wines too, characterized by the production of froth due to the presence in the bottle of carbon dioxide produced by fermentation.

To obtain a sparkling wine, you can follow two methods: the **Classical Method** (or Champenois), characterized by slow re-fermentation in the bottle or the **Martinotti-Charmat Method** where, on the other hand, the sparkling process takes place in the autoclave.



The graph shows the stages of the process and the temperatures normally used.

3.1 The fermentation: Focus On

The most important phase of each wine-making cycle is surely fermentation. Fermentation is an exothermic reaction that transforms 90% of sugar into alcohol, that is the must into wine. The oenologist establishes exactly the length and intensity of the transformation, parameters that contribute in a decisive way to the quality of the final product and its organoleptic properties.

Fermentation increases the temperature of the mass up to values incompatible with the life of the yeasts responsible for the reaction (35 ÷ 40°C).

For this reason, this must take place at monitored and controlled **temperature, with modern and flexible systems capable of offering both cold and warmth** (i.e. heat pump systems).

$$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + \text{energy}$$

	Min T (°C)	Max T (°C)	Average T (°C)
White wines	12	20	18
Sparkling wines	12	18	15
Rosé wines	12	20	18
Red wines	22	30	25-26
Raisin wines	20	24	22

4.0 The importance of the wine-making technological system in the wine industry

The evolution from quantity to quality in wine-making has required **increasingly greater control of all the production process** phases, where the cooling system becomes far more important.

The use of the cold/heat in the cellar is necessary to guarantee the various temperatures during the different phases of the wine-making process:

- **Lowering** the white grape must temperature to about 12°C for static decanting treatments;
- **Maintenance** of the fermentation temperature (17 ÷ 20°C for white wines; 25 ÷ 28°C for red wines);
- Quick cooling to block **fermentation**;
- Product **clarification** and **conservation** operations;
- Wine cold **tartaric stabilisation**.

Moreover, anticipating the grape harvest from the end of September to the end of August has made the use of a suitably sized cooling system that can meet all the requirements of the winery, even more necessary.

In the oenological sector too, the first classification of the cooling systems is as follows:

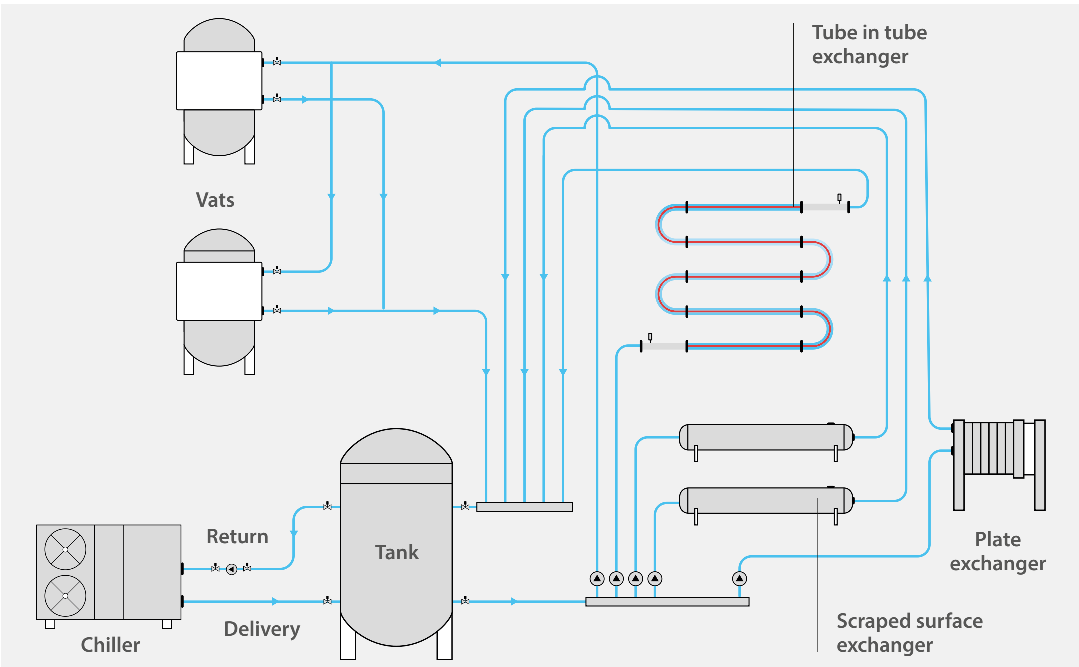
- Direct cooling;
- Indirect cooling.

In the first case, the **heat exchange** between coolant and must **takes places directly** inside the evaporator. In the second case, on the other hand, **a solution** with a low freezing point (glycol-water) **is used**.

With both the direct and indirect system, reaching the product temperature setpoint and maintaining it is obtained in two ways:

- Internal;
- External.

Adjusting the flow of the working fluid can take place by adjusting the opening/closing of valves located near the vinificator, or acting directly on the pump ON/OFF on the secondary branch.



Principle diagram of a modern wine-making system

4.1 Internal mode cooling

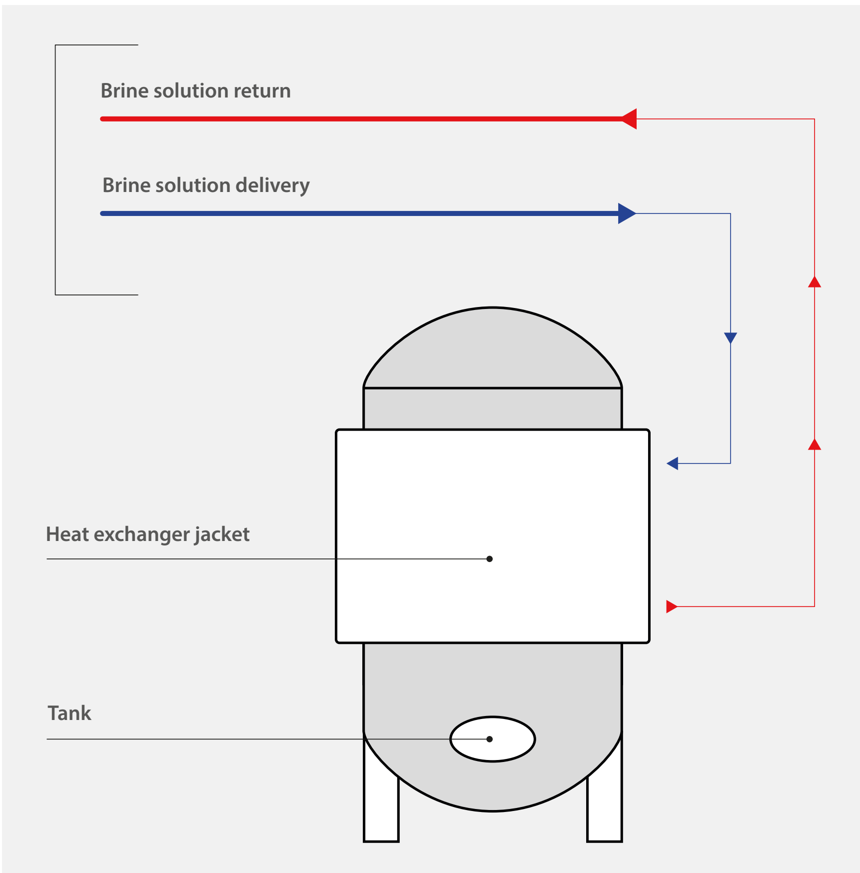
Reaching the preset temperature

During the static decanting, stabilisation and clarifying phases, the priority is reaching the set temperature of the must/wine as quickly as possible.

This can be done in internal mode using immersed coil exchangers, refrigerated plates, jacket or mantle heat exchangers. This mode has the disadvantage of having an uneven temperature distribution inside the product. In fact, very near the component, cooling is quick while, near the wall, the product cools down more slowly.

This phenomenon of thermal layering is much more accentuated vertically and for large volumes.

It is therefore necessary to activate convective motions using rotating parts or pumps, checking that this does not affect the process in progress. The oenologist or cellarman must therefore be able to control the stirring device and they will use it only when this does not affect the process phase in progress.



Cooling in internal mode

Temperature maintenance

What was said about lowering the temperature applies. It is possible to reduce the lack of homogeneity in the treatment with a mixer, in order to allow all the product to touch the surface of the cooling component: this way it is possible to maintain a 0.5°C hysteresis compared with the set value.

The components normally used are:

- Thermal exchange jacket;
- Coil exchanger;
- Refrigerated plate (normally called biscuit).

In modern wineries, stainless steel tanks are used, provided with a cavity within which chilled water flows, to control the must/wine temperature.

Immersion exchangers (either plate or coil) are used above all in:

- Small stainless steel modern tanks without an external jacket;
- Old stainless steel tanks not fitted with an external jacket;
- Concrete tanks.

Cantina Vivallis. Tanks with thermal exchange jackets for temperature control

4.2 External mode cooling

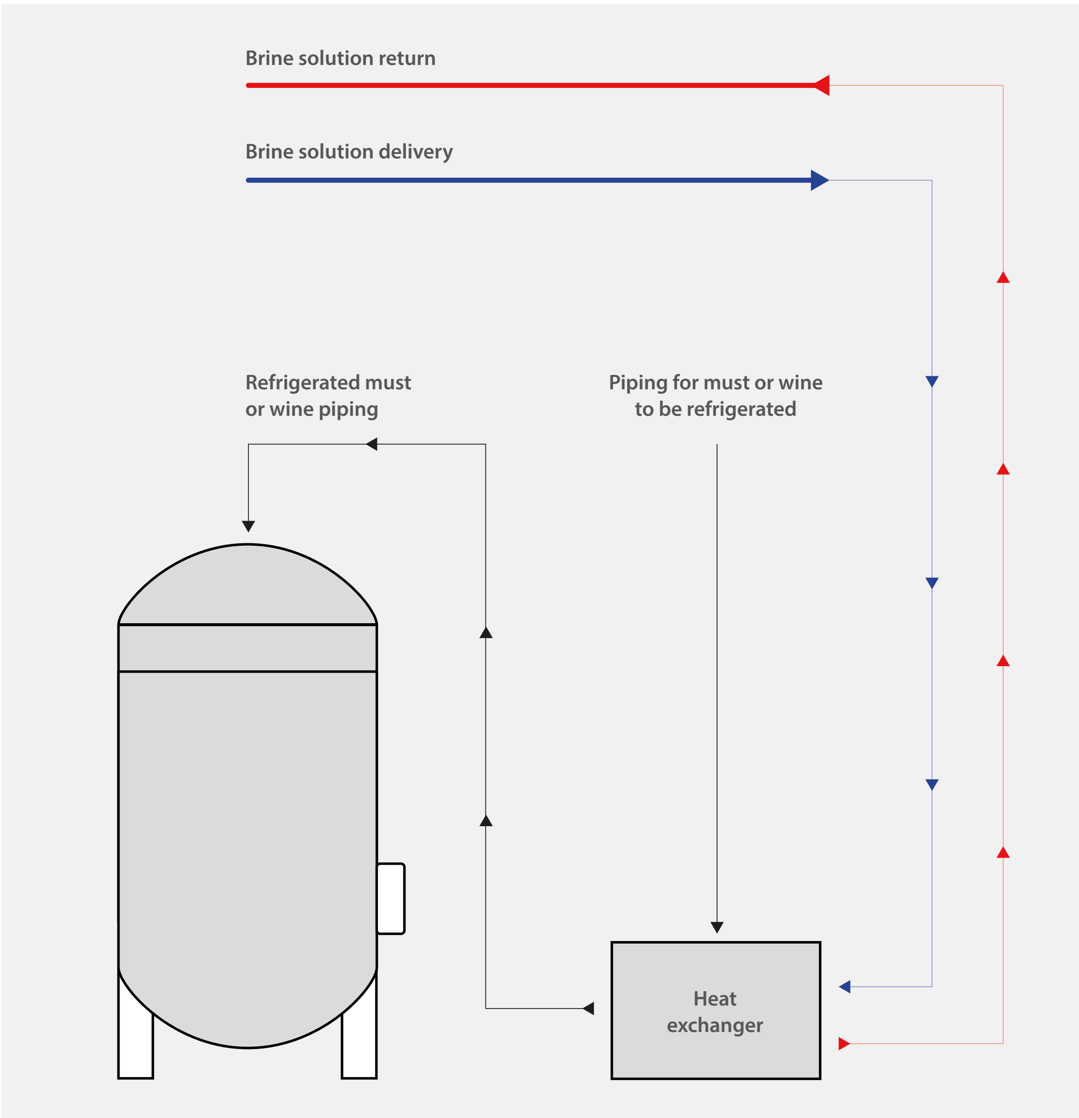
Reaching the preset temperature

In external mode cooling, lowering the must or wine temperature takes place in heat exchangers outside the vat: according to the particular process phase, the best component can be chosen (shell and tube, tube in tube, scraped surface, plate exchanger).

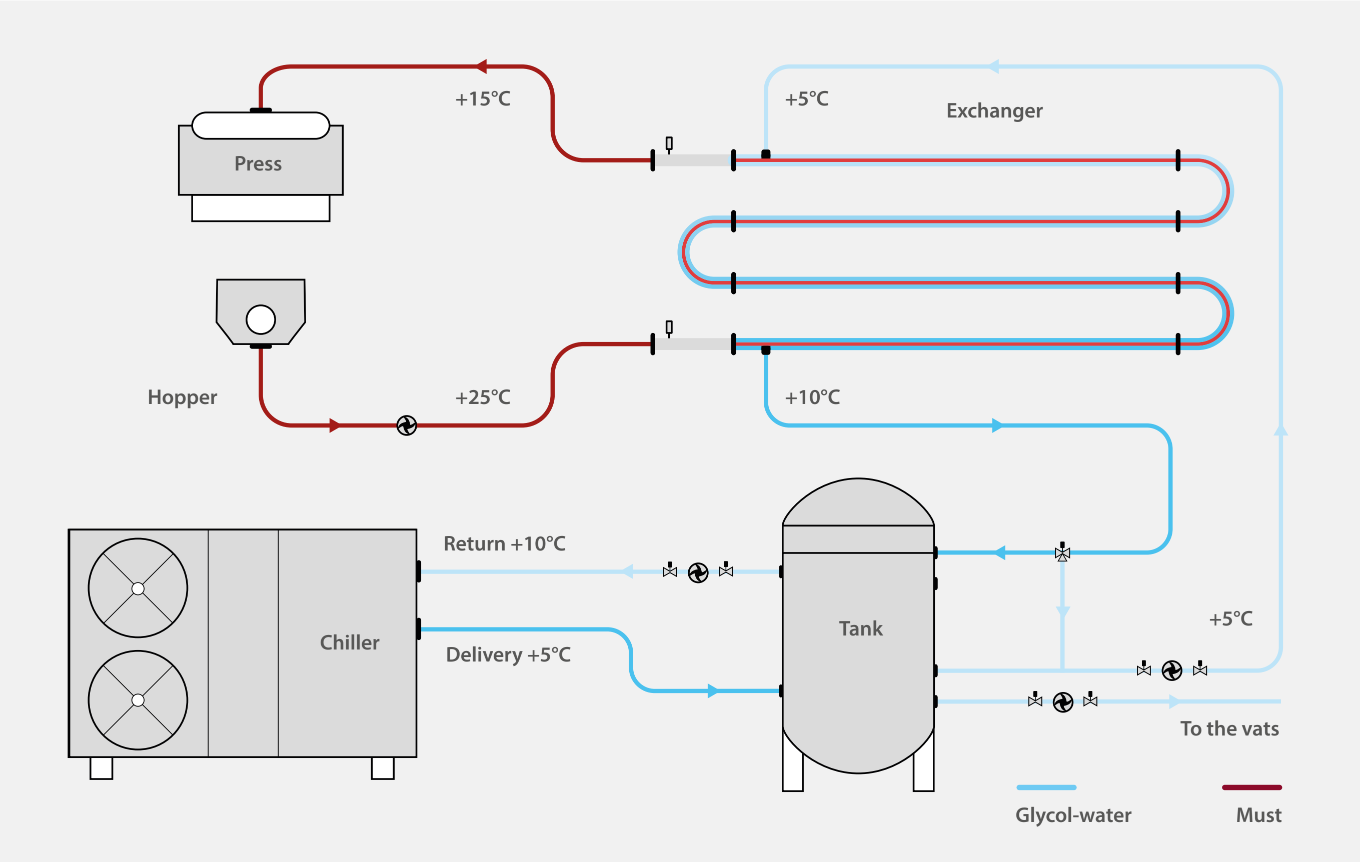
Unless the system does not allow it, the external solution for decanting, clarifying and stabilising is the recommended solution.

Temperature maintenance

With this cooling mode, temperature control during maintenance is less precise, with temperature fluctuations that can reach even 5 ÷ 6°C.



Cooling in external mode



Example of use of tube in tube exchanger to cool the crushed grapes.

In external mode, components generally offer large exchange surfaces. According to the phase, exchangers can be:

Tube in tube

Essentially, it consists of coaxial tubes. The more internal pipe contains the product while the coolant flows in the external tube. They are modular tubes with inspectionable DIN fittings and thermometers measuring the incoming/outgoing must temperature. As to the size, surfaces exceeding 15 ÷ 20 m^2 cannot be used.

Shell and tube

The must/wine flows inside the tubes, while the coolant (water or refrigerant gas) circulates in the mantle. Modulating valves are normally used to adjust the flow of the coolant, together with thermometers to measure the incoming and outgoing must temperature.

The temperatures that can be reached are no lower than 5°C. Lower temperatures might lead to deposits that would affect the effectiveness of the thermal exchange, as well as obstruct the passage in the tubes.

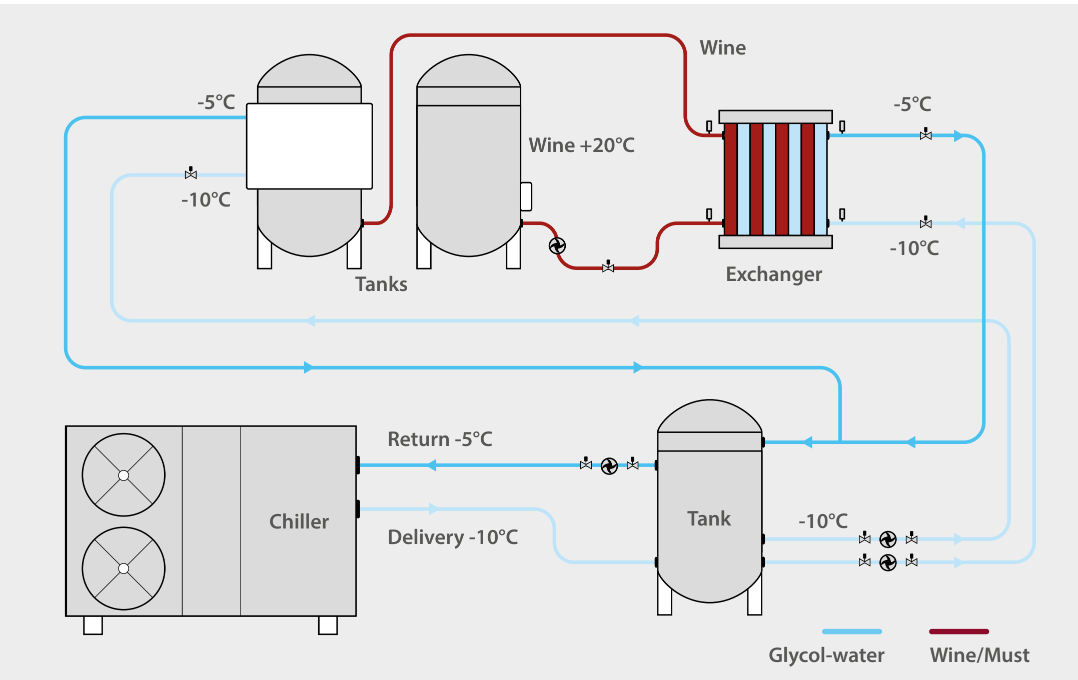
Scraped surface

It consists of one or more horizontal concentric cylinders. An electric pump makes the product flow inside the central cylinder. The scraping element is a shaft rotating at low speed with scrapers in food grade material and wear-resistant.

Thanks to this element that eliminates ice and crystals from the cylinder walls, even negative operating temperatures can be reached. For this reason, it is often used during the tartaric stabilisation phase.

Plates

They allow lowering quickly the temperature of the wine stored for tartaric stabilisation. It can be equipped with temperature control system and product side pump.
It is generally built in multiple sections and used for fluids without suspended products.



Example of use of the plate exchanger during the wine stabilisation phase

Polypropylene movable straps

It is a cheap and movable system to apply to existing tanks, consisting of tubes placed side by side in which glycol-water circulates. It offers the possibility of working with temperatures from -20°C to +60°C and up to a pressure of 1.5 bar.

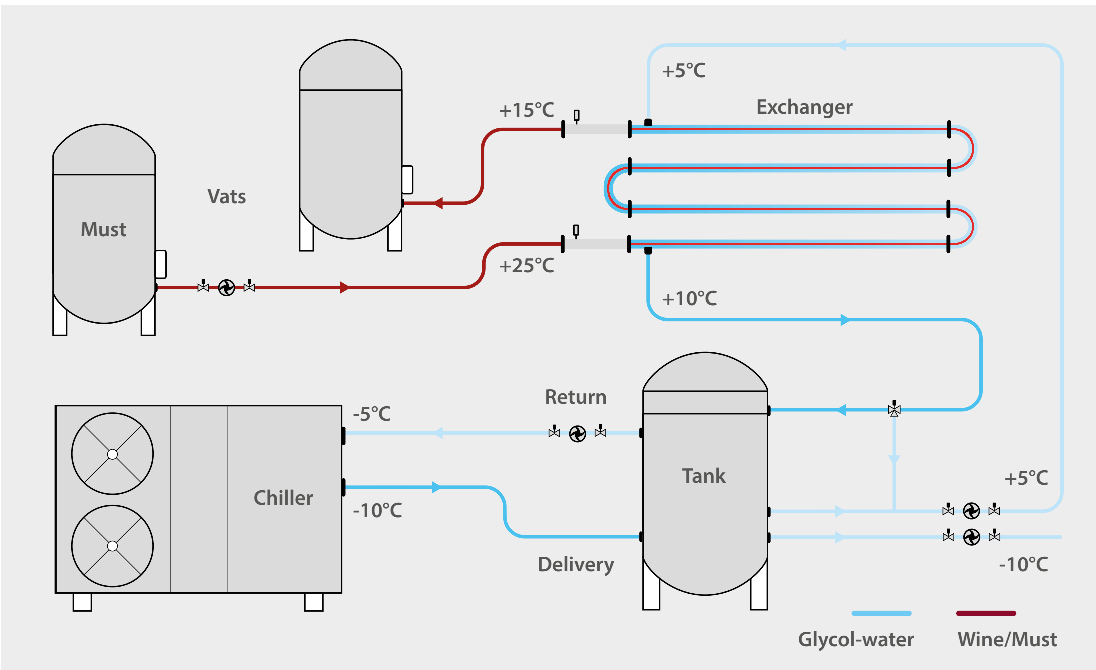
4.3 Guidelines to calculate capacities

Chilling capacity in external mode

It is assumed that the pressing system maintains continuity at the maximum capacity values and that, coming out of the presses/stemmer-crushers, the must temperature is the same as the external air temperature.

$$P_{ext} = f(G) \cdot c_p \cdot (t_{ini} - t_{fin}) \quad [kW]$$

- f(G) = Value calculated from the must capacity G in tons per hour (it varies according to the type of conveyor)
- C_p = Must specific heat (3.58 kJ/ (kg °C))
- T_{ini} = Must temperature when entering the exchanger in degrees Celsius
- T_{fin} = Must temperature coming out of the exchanger in degrees Celsius



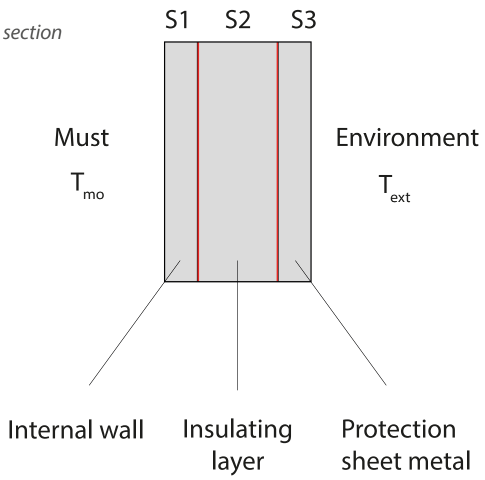
Example of use of tube in tube exchanger to lower the temperature of the wine.

Capacity of maintaining the decanting temperature - Internal mode

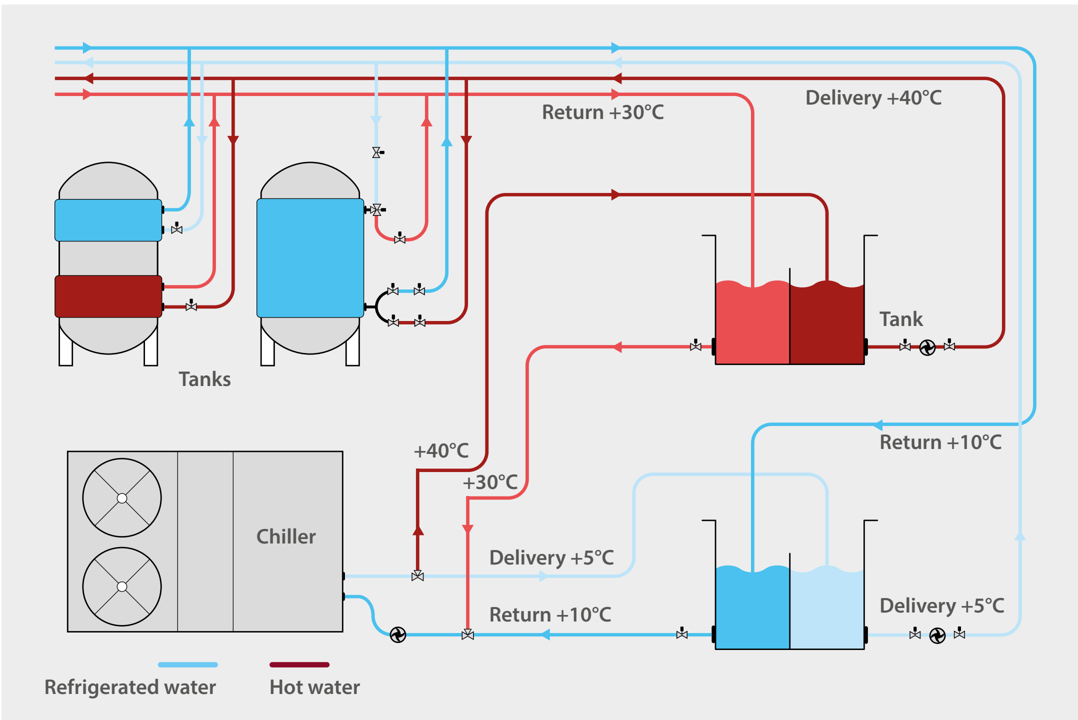
The must has already reached the process temperature in internal or external mode.
The thermal power that the must exchanges with the outside can be calculated as follows:

$$P_{int} = U \cdot \left[2 \cdot \left(\frac{\pi \cdot D^2}{4}\right) + \frac{4V}{10 \cdot D}\right] \cdot (T_{mo} - T_{ext}) \quad [W]$$

Tank wall section



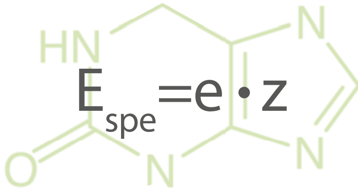
- U = global heat transfer coeff. [W/(m² °C)]
- D = Tank diameter [m]
- V = Tank volume [hl]
- T_{ext} = Ambient temperature [°C]
- T_{mo} = Must temperature inside the tank [°C]



Principle diagram to check the must/wine temperature.

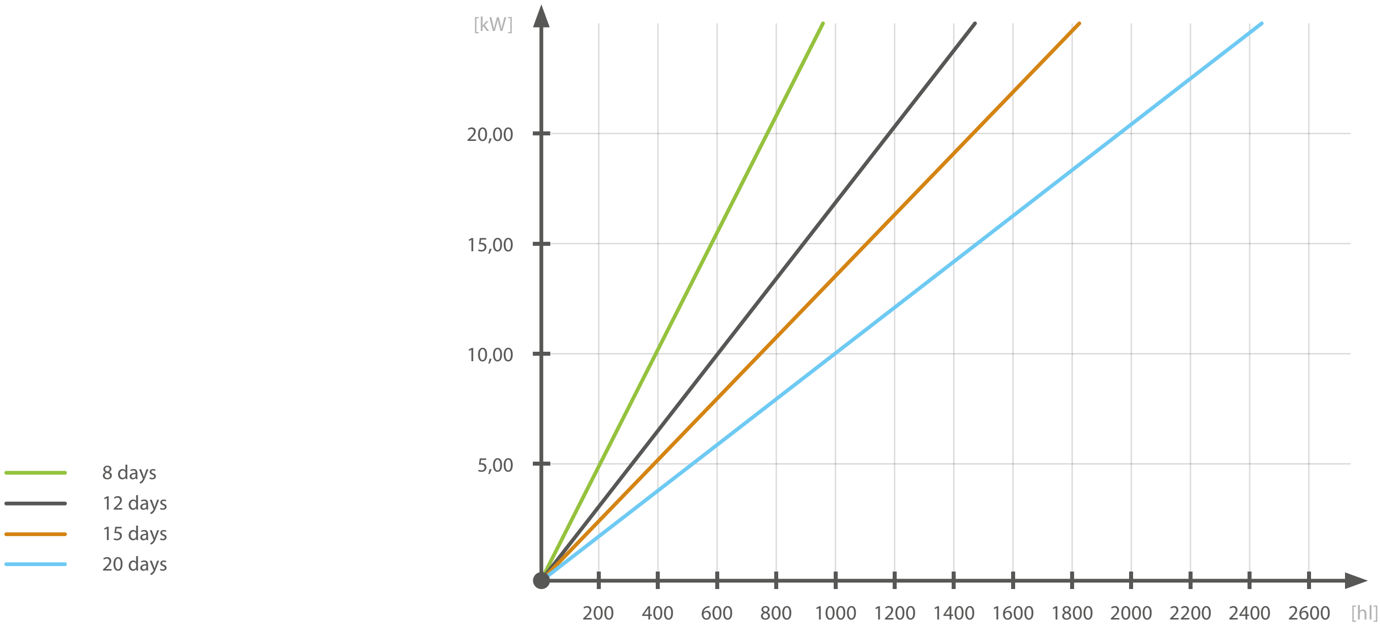
Energy developed during fermentation

- E_{spe} = thermal energy developed by a litre of must [kJ/l]
- e = specific energy per gram of must [kJ/g]
- z = quantity of sugar in a litre of must [g/l]



$$E_{spe} = e \cdot z$$

Hectolitres of must that can be controlled in fermentation



Example of progress of controlled fermentation for white must

Temperature progress and chiller operation according to the days

5.0 The cellar system

The cellar system consists of various rooms, each one characterized by particular thermohygrometric conditions to be maintained:

- Storing room for young wine: 15 – 18°C;
- Ageing cellars: 12 – 18°C with a percentage of relative humidity included between 75 and 85%;
- Bottle store: 18 – 20°C;
- Drying rooms: 25 – 30°C with relative humidity included between 40 and 70%.

1. *Tasting room*
2. *Offices*
3. *Vinification room*
4. *Storage*
5. *Ageing (in the bottle)*
6. *Barrique/barrel room*

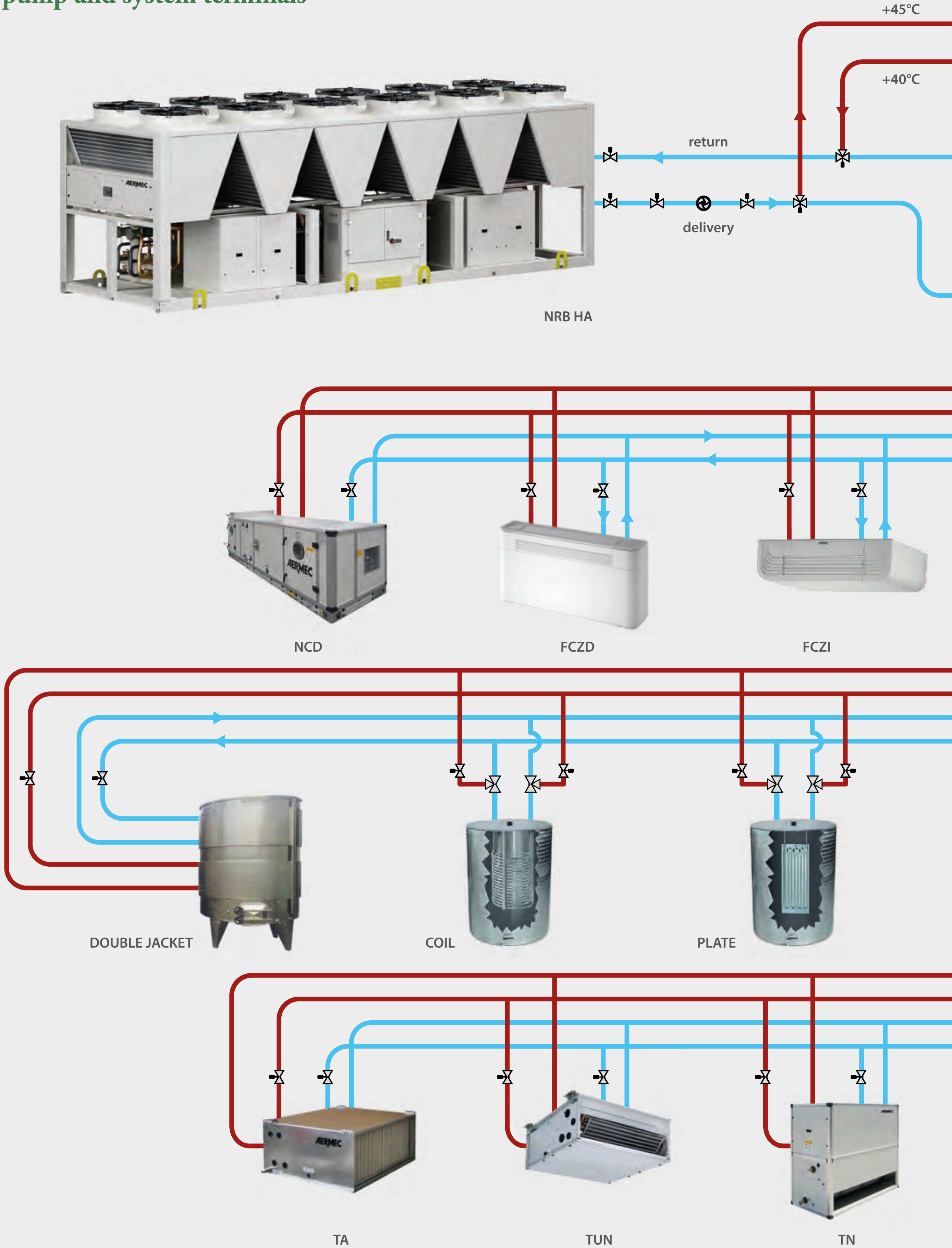
A solution for each room

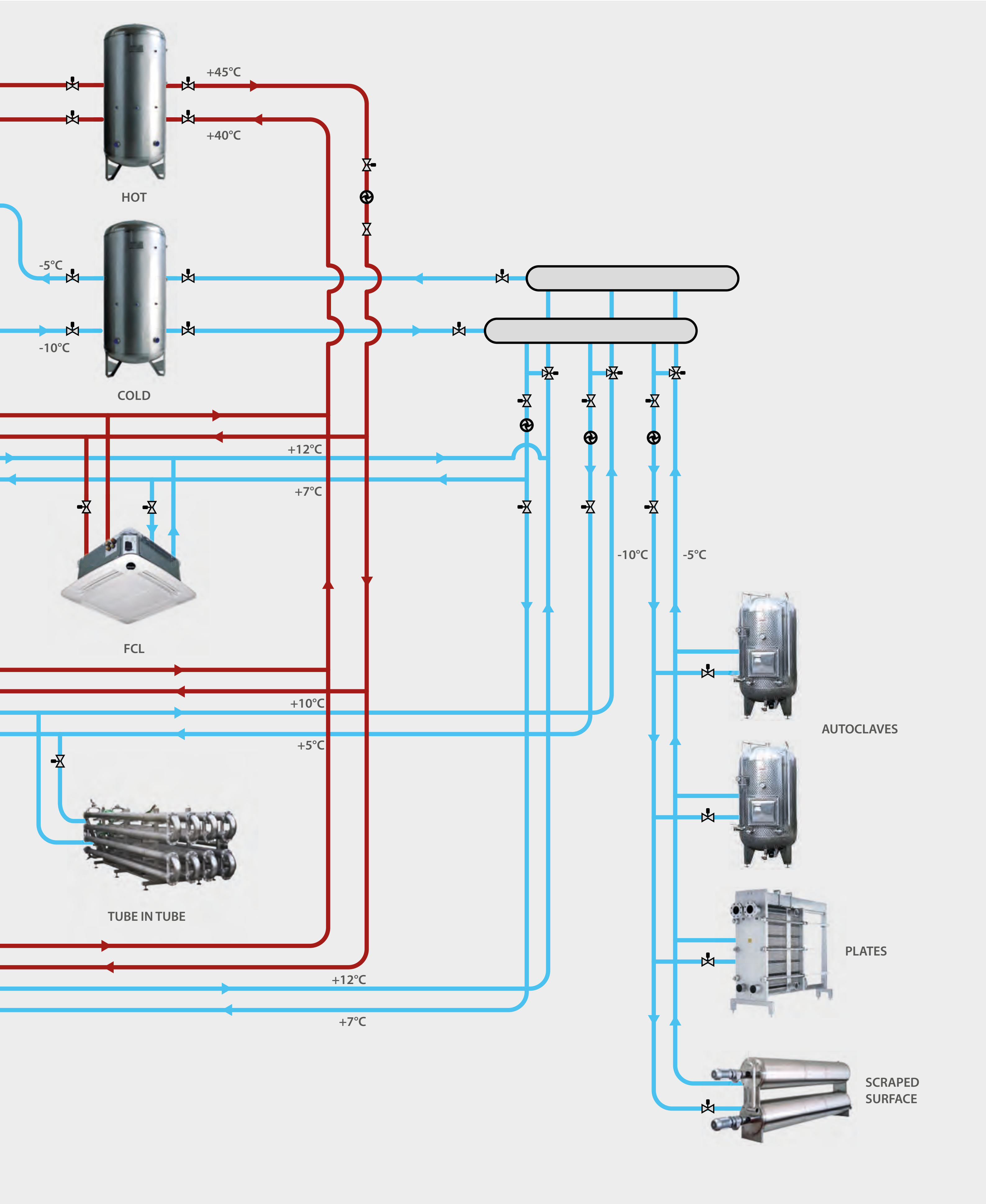
- **Vinification:** heat pumps / chillers
- **Tasting room and offices:** fan coils together with heat pumps / chiller
- **Storage, ageing (in the bottle), barrique / barrel room:** air handling unit, thermoventilation units together with heat pumps / chiller

Aermec products can not only supply chilled or hot water to terminals such as tank jackets and exchangers but, thanks to the wide choice of system solutions available, they can also guarantee the temperature and humidity conditions required in each individual room, with the possibility of remote control and monitoring, to make the system more reliable and easier to manage.

1 *Vinification room*
2 *Storage*
3 *Tasting room*
4 *Barrique / barrel room*
5 *Ageing (in the bottle)*

Heat pump and system terminals




+45°C
+40°C
HOT
-5°C
-10°C
COLD
+12°C
+7°C
FCL
-10°C
-5°C
AUTOCLAVES
+10°C
+5°C
TUBE IN TUBE
PLATES
+12°C
+7°C
SCRAPED
SURFACE

6.0 The Aermec range

To answer the demands of wineries in all countries, Aermec makes chillers and heat pumps sized to meet every requirement of the vinification cycle.

Offered in a "packaged" solution, the ANL, NRB small and NRB air-cooled ranges ensure high energy efficiency levels, guaranteeing considerable savings both in new projects and the upgrading of existing systems.

Apart from the Eurovent certification that guarantees performance, Aermec units are equipped with the latest and most advanced technologies as well as with high quality components.

Built with hot-dipped galvanized steel sheet and coated with polyester powders, the machine load-bearing structure guarantees strength and accessibility for maintenance operations.

The fan group consists of statically and dynamically balanced helical fans. The application of multiple scroll compressors guarantees reliability and safety and allows effective step adjustment, with reduced consumption at partial load. The majority of models offer the compliant solution, the most advanced technology on the market that guarantees high efficiency and reliability, as well as low noise level

NRB multiscroll unit fitted with buffer tank and pumps and with plate evaporator in AISI 316

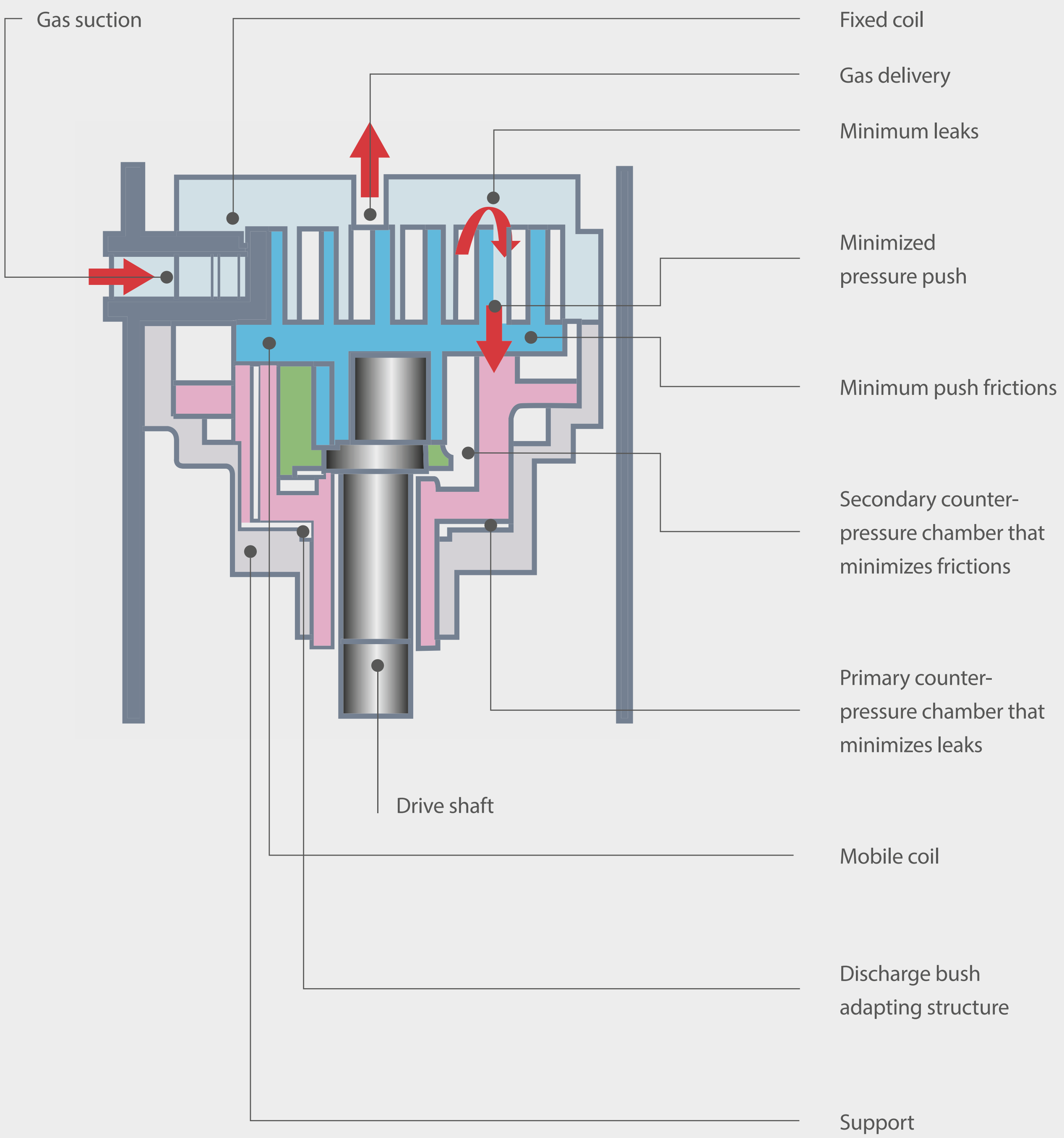
Compliant Scroll technology guarantees axial and radial adaptability between the two coils. Axial adaptability reduces losses to a minimum. Radial adaptability increases the compressor useful life since it allows small solid parts and liquid coolant to pass. Thanks to this particular combination, the compressor global efficiency increases.

According to the configuration, there are safety devices such as: high and low pressure switches, high and low pressure transducers, sensor checking the temperature of the water coming into and going out of the unit. The system-side exchanger, with brazed plates in AISI 316 steel, offers frost protection as standard. The NRB small models and all heat pumps offer air-side finned exchanger, made with copper tubes and aluminium turbolenced fins.

On the other hand, ANL and NRB series chillers use a micro-channel exchanger that guarantees considerable energy efficiency and lower coolant content. The double thermostatic valve modulates the gas flow to the evaporator according to the thermal load, offering a double cold setpoint, to cover a wide operating range from +18°C to -10°C of water produced.

Compliant Scroll technology

Mobile support in axial direction
Considerable reduction in leaks and frictions



ANL SERIES
Cooling capacity: 13 ÷ 44 kW
Thermal capacity: 13 ÷ 46 kW

All models are available with integrated hydronic kit, a plug&play solution that makes installation easier. The kit is available in many configurations: buffer tank with single or double pumps and various heads.
MODUCONTROL for the ANL units allows also offsetting the setpoint with the outside temperature, managing the alarm history, counting operating hours, local and remote control, reading all sensor and transducer parameters.

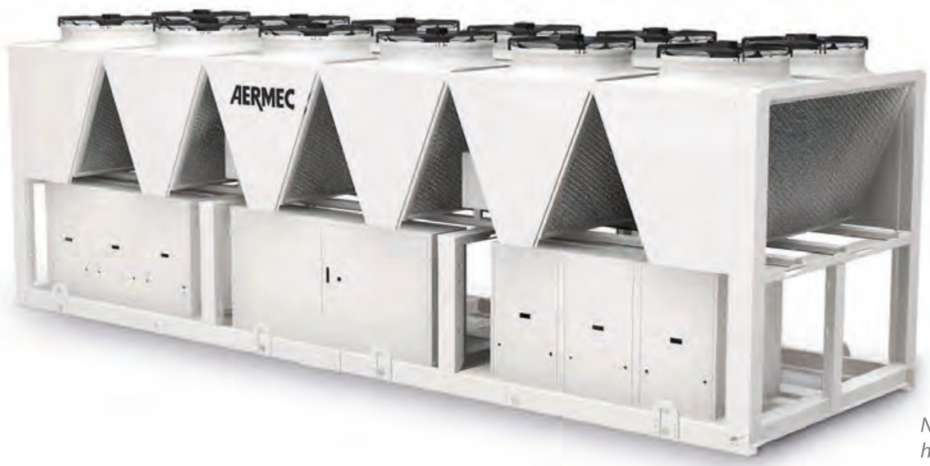
The NRB series are fitted with the pCO5 board that allows managing the temperature according to load conditions, as well as managing the alarm history, pumps, heating elements and other components, defining working hours, managing defrosting cycles with self-adaptive logics for the benefit of efficiency, setting two machines with Master/Slave logics, controlling remotely with dedicated display.

NRB small SERIES
Cooling capacity: 56 ÷ 200 kW
Thermal capacity: 59 ÷ 200 kW

NRB SERIES
Cooling capacity: 206 ÷ 1050 kW
Thermal capacity: 214 ÷ 1007 kW

Moreover, on request, the NRB series reaches the operating limit of -20°C external air by switching off the ventilation of 1 or more V-blocks; in this case it is necessary:

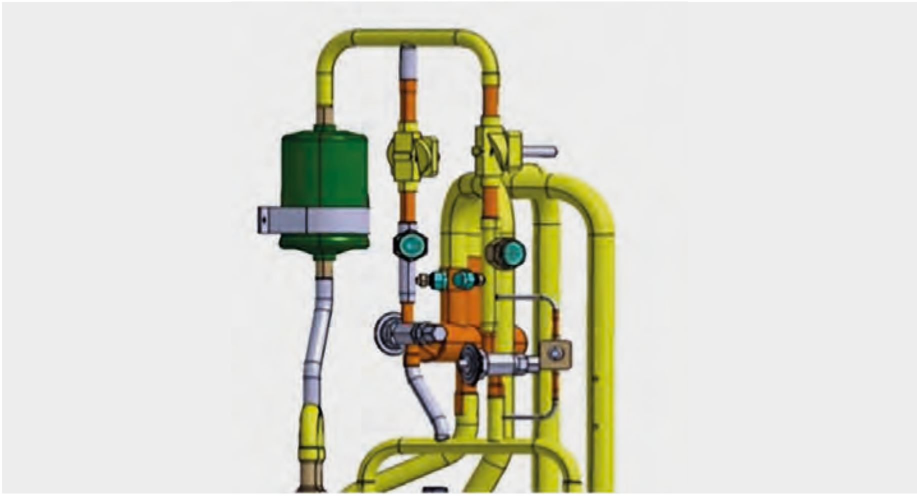
- Option J;
- Evaporator double insulation;
- Hydraulic circuit anti-freeze heating elements;
- Electrical panel space heaters;



NRB series
heat pump

6.1 Main options

- **Electronic thermostatic valve** for improved superheating control;
- **Shell and tube system-side exchanger** (on request on NRB according to version);
- **Double thermostatic valve** to guarantee water from **-10°C to +18°C** in cold and from **+25°C to +55°C** in hot operation;
- **Heat Recovery** for the simultaneous heating and cooling production;



- **Inverter fans** for the continuous adjustment of the air flow;
- **Oversized fans** to overcome load losses in-ducted systems;
- Condensation temperature control device (**DCPX**);
- **HP FLOATING** adjustment possibility for improved energy savings

- **Buffer tank in stainless steel AISI 304** (on request according to the model);
- **Inverter pump on the primary**, settable on two steps (according to the setpoint to ensure the difference in temperature set on the two branches of the system at all times). Moreover, it is useful above all during the installation since it adapts automatically to the system head.

Chillers

ANL	Vers		050	070	080	090	102	152	202
Cooling capacity	°	kW	13,4	16,4	20,4	22,2	26,5	32,9	42,8
	P / A	kW	13,5	16,6	20,6	22,4	26,8	33,2	43,2
	N / Q	kW	13,6	16,7	20,7	22,5	26,8	33,3	43,3
Power input	°	kW	4,1	4,9	6,4	6,8	8,0	10,2	13,5
	P / A	kW	4,1	4,9	6,4	6,7	8,1	10,5	13,8
	N / Q	kW	4,2	5,0	6,5	6,8	8,5	10,6	13,8
EER	°	W/W	3,26	3,33	3,18	3,28	3,32	3,21	3,18
	P / A	W/W	3,31	3,38	3,23	3,35	3,32	3,15	3,13
	N / Q	W/W	3,24	3,33	3,19	3,31	3,17	3,15	3,13
SEER	°	W/W	3,88	3,97	3,88	3,96	3,95	3,92	3,98
	P / A	W/W	4,02	4,08	4,03	4,08	3,93	3,81	3,82
	N / Q	W/W	3,81	4,01	3,93	4,02	3,81	3,81	3,82

NRB	Vers		282	302	332	352
Cooling cap.	E	kW	60,6	68,4	77,0	89,2
Power input	E	kW	18,6	21,1	23,8	28,3
EER	E		3,26	3,24	3,23	3,16
ESEER	E		4,35	4,46	4,39	4,38

NRB	Vers		502	552	602	0652	0682	0702	0752
Cooling cap.	A	kW	103,9	114,8	130,1	140,0	167,9	186,9	207,6
Power input	A	kW	31,4	35,4	40,3	45,0	51,9	59,2	69,6
EER	A		3,31	3,24	3,23	3,11	3,24	3,16	2,98
ESEER	A		4,31	4,35	4,46	4,39	4,40	4,34	4,37

The last 4 sizes are available also in the double cooling circuit version

Heat pumps

ANL	Vers		050	070	080	090	102	152	202
Cooling capacity	H	kW	13,4	16,4	20,4	22,4	25,9	31,9	40,8
	HP/HA	kW	13,5	16,6	20,6	22,4	26,2	32,2	41,2
Pot. Assorbita	H	kW	4,1	4,9	6,4	6,8	8,7	10,4	14,2
	HP/HA	kW	4,1	4,8	6,3	6,7	8,8	10,7	14,5
EER	H	W/W	3,26	3,37	3,18	3,27	2,96	3,06	2,87
	HP/HA	W/W	3,31	3,43	3,25	3,35	2,96	3,01	2,84
SEER	H	W/W	3,78	3,91	3,79	3,80	3,56	3,75	3,59
	HP/HA	W/W	4,00	4,07	4,02	4,08	3,56	3,52	3,39
Heating capacity	H	kW	14,1	17,4	22,3	24,3	29,1	35,2	45,5
	HP/HA	kW	13,9	17,2	22,1	24,1	28,9	34,8	45,1
Power input	H	kW	4,4	5,0	6,4	7,1	8,8	10,4	13,7
	HP/HA	kW	4,3	4,9	6,4	7,0	8,9	10,7	14,1
COP	H	W/W	3,21	3,48	3,46	3,42	3,30	3,39	3,32
	HP/HA	W/W	3,20	3,49	3,48	3,46	3,23	3,25	3,21
SCOP	H	kW	3,43	3,55	3,55	3,53	3,65	3,88	3,83
	HP/HA	kW	3,48	3,63	3,63	3,60	3,58	3,58	3,60

NRB H	Vers		0282	0302	0332	0352
Cooling cap.	E	kW	55,4	62,1	70,0	81,2
Power input	E	kW	18,5	21,0	23,7	28,3
EER	E		3,00	2,96	2,95	2,86
SEER	E	W/W	4,28	4,32	4,22	4,24
Heating cap.	E	kW	59,0	68,2	76,6	87,1
Power input	E	kW	17,5	20,3	22,9	26,4
COP	E		3,37	3,36	3,35	3,30
SCOP	E	W/W	4,03	4,04	4,03	3,89

NRB H	Vers		0502	0552	0602	0652	0682	0702	0752
Cooling cap.	A	kW	96,9	106,5	123,6	133,6	163,9	178,5	199,9
Power input	A	kW	32,3	36,1	39,5	45,0	50,7	57,0	66,5
EER	A		3,00	2,95	3,13	2,97	3,23	3,13	3,01
SEER	A	W/W	4,21	4,14	4,39	4,20	4,38	4,27	4,24
Heating cap.	A	kW	100,3	110,9	124,3	138,2	164,1	179,7	200,6
Power input	A	kW	30,7	33,5	37,6	42,0	50,2	56,3	62,9
COP	A		3,27	3,31	3,31	3,29	3,27	3,19	3,19
SCOP	A	W/W	3,54	3,65	3,65	3,66	3,57	3,61	3,62

The last 4 sizes are available also in the double cooling circuit version

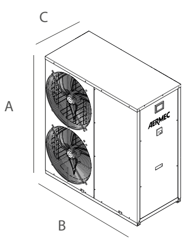
Weights and dimensions

ANL	Vers.		050	070	080	090	102	152	202
Dimens. A	° / H/HP	mm	1252				1450		
	HA	mm	1281				1450		
Dimens. B	° /A/HA	mm	1124				750		
			1165				750		
Dimens. C	° / H/ P	mm	384/428*				1750		
	A/HA	mm	550				1750		
ANL weights	°	kg	120	120	120	156	270	293	329
	P	kg	127	127	163	163	288	314	350
	A	kg	147	147	147	183	338	364	400
ANL H weights	H	kg	120	120	156	156	295	322	358
	HP	kg	127	150	163	163	313	343	379
	HA	kg	147	150	183	183	363	393	429

*with feet

NRB	Vers.		0282	0302	0332	0352
Dimens. A	Tutte	mm	1680			
Dimens. B	Tutte	mm	1100			
Dimens. C	Tutte	mm	2450	2950	2950	2950

NRB	Vers.		502	552	602	652	682	702	752
Dimens. A	Tutte	mm	1898						
Dimens. B	Tutte	mm	1100						
Dimens. C	Tutte	mm	3200				4010	4010	4010



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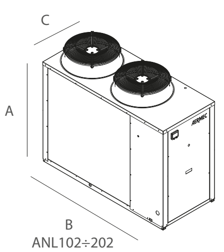

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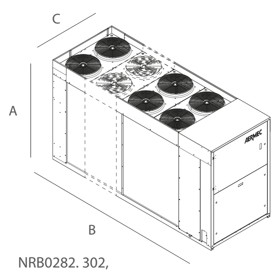

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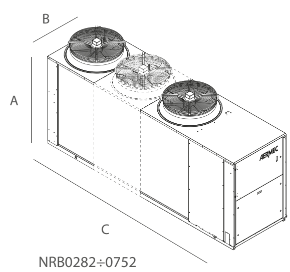

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NRB0502, 0552, 0602, 0652, 682, 0702, 0752HA e HE

AERMEC

Chillers

NRB	Vers		800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600
Cooling cap.	A	kW	224,1	252,2	283,7	326,1	361,2	411,7	462,2	519,2	576,0	633,3	697,6	757,5	805,8	867,0	928,7	980,8	1026,8
	E	kW	219,2	248,3	275,0	321,4	358,7	403,2	455,0	514,5	569,0	637,2	688,3	741,1	794,3	857,9	911,7	965,1	1019,4
	U	kW	227,6	257,6	286,5	329,6	369,8	414,7	466,9	529,2	594,0	655,1	716,9	765,5	815,3	879,0	940,9	999,7	1049,5
	N	kW	227,7	260,4	284,7	327,7	367,7	412,3	466,1	521,6	579,1	645,7	702,6	749,4	804,7	866,4	926,7	973,5	1029,9
Power input	A	kW	70,6	80,9	90,2	104,7	115,3	131,8	147,6	166,3	183,5	203,1	223,3	240,5	256,5	277,0	297,0	314,4	330,3
	E	kW	69,6	79,4	88,5	102,2	114,9	129,8	144,5	164,7	183,0	203,4	221,4	236,5	255,5	274,7	290,6	310,5	327,8
	U	kW	68,8	77,7	86,8	99,5	111,7	126,1	140,9	159,5	179,0	197,8	215,3	229,4	248,9	265,7	282,3	302,5	319,5
	N	kW	68,5	78,9	86,4	98,5	111,9	125,4	140,4	157,8	176,0	194,6	212,9	229,0	246,7	263,5	282,7	301,1	319,3
EER	A	W/W	3,17	3,12	3,15	3,12	3,13	3,12	3,13	3,12	3,14	3,12	3,12	3,15	3,14	3,13	3,13	3,12	3,11
	E	W/W	3,15	3,13	3,11	3,15	3,12	3,11	3,15	3,12	3,11	3,13	3,11	3,13	3,11	3,12	3,14	3,11	3,11
	U	W/W	3,31	3,31	3,30	3,31	3,31	3,29	3,31	3,32	3,32	3,31	3,33	3,34	3,28	3,31	3,33	3,30	3,28
	N	W/W	3,32	3,30	3,30	3,33	3,29	3,29	3,32	3,31	3,29	3,32	3,30	3,27	3,26	3,29	3,28	3,23	3,23
SEER	A	W/W	4,28	4,17	4,27	4,28	4,36	4,37	4,43	4,30	4,25	4,20	4,26	4,37	4,29	4,27	4,27	4,22	4,20
	E	W/W	4,30	4,20	4,26	4,35	4,40	4,35	4,51	4,33	4,23	4,30	4,31	4,38	4,28	4,30	4,34	4,25	4,28
	U	W/W	4,35	4,35	4,38	4,47	4,51	4,50	4,58	4,51	4,42	4,42	4,47	4,56	4,36	4,40	4,47	4,35	4,36
	N	W/W	4,44	4,38	4,44	4,55	4,54	4,56	4,65	4,54	4,43	4,47	4,49	4,49	4,40	4,44	4,43	4,33	4,35

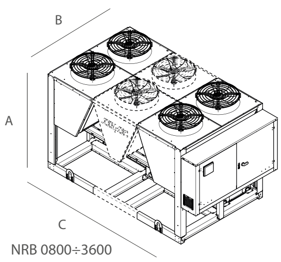
Heat pumps

NRB H	Vers		800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600
Cooling cap.	A	kW	206,2	243,8	266,9	297,0	329,2	385,5	425,3	488,4	538,3	601,4	651,3	708,6	745,3	815,1	859,0	928,0	971,4
	E	kW	209,6	241,7	264,7	294,5	326,7	377,8	432,4	489,4	540,5	597,8	647,7	699,1	734,9	798,7	841,0	904,0	944,9
Power input	A	kW	71,8	78,2	88,1	102,2	117,2	129,2	147,2	163,7	184,8	201,3	222,3	237,4	257,9	274,4	295,7	312,0	333,6
	E	kW	67,3	77,4	85,0	98,1	112,4	125,3	139,1	157,0	177,4	192,3	215,2	231,2	250,7	269,1	289,6	308,2	327,5
EER	A	W/W	2,87	3,12	3,03	2,91	2,81	2,98	2,89	2,98	2,91	2,99	2,93	2,99	2,89	2,97	2,91	2,97	2,91
	E	W/W	3,12	3,12	3,11	3,00	2,91	3,02	3,11	3,12	3,05	3,11	3,01	3,02	2,93	2,97	2,90	2,93	2,89
SEER	A	W/W	3,96	4,13	4,09	4,09	4,07	4,23	4,22	4,22	4,10	4,11	4,12	4,17	4,15	4,13	4,15	4,15	4,14
	E	W/W	4,16	4,15	4,18	4,19	4,16	4,27	4,39	4,36	4,22	4,24	4,22	4,24	4,16	4,18	4,14	4,12	4,11
Heating cap.	A	kW	214,3	254,4	279,0	310,5	341,2	400,9	438,9	506,0	553,2	620,0	666,5	730,0	771,1	840,0	885,5	954,2	999,6
	E	kW	223,4	258,1	283,7	316,7	349,3	403,2	458,7	520,7	571,9	634,1	683,9	741,3	784,2	848,2	895,3	960,1	1006,8
Power input	A	kW	66,6	79,3	86,7	97,1	106,2	124,8	137,1	157,5	171,8	193,5	207,0	226,8	240,1	260,9	275,3	297,4	311,6
	E	kW	69,3	80,5	87,9	98,5	109,0	126,1	143,1	162,7	177,1	198,2	211,7	230,0	244,9	264,9	279,5	299,5	315,3
COP	A	W/W	3,22	3,21	3,22	3,20	3,21	3,21	3,20	3,21	3,22	3,20	3,22	3,22	3,21	3,22	3,22	3,21	3,21
	E	W/W	3,22	3,21	3,23	3,22	3,20	3,20	3,21	3,20	3,23	3,20	3,23	3,22	3,20	3,20	3,20	3,21	3,19
SCOP	A	kW	3,03	3,08	3,03	3,08	3,03	3,10	3,13	3,08	3,30	/	/	/	/	/	/	/	/
	E	kW	3,05	3,08	3,05	3,10	3,03	3,08	3,13	3,05	3,30	/	/	/	/	/	/	/	/

Weights and dimensions

NRB	Vers.		0800	0900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600
Dimens. A	A/U	mm	2450																
Dimens. B	A/U	mm	2200																
Dimens. C	A	mm	2780*	2780*	3970	3970	3970	3970	4760	4760	5950	5950	7140	8330	8330	8330	9520	9520	9520
	E /U	mm	3970	3970	3970	4760	4760	4760	5950	7140	7140	8330	8330	9520	9520	10710	11900	11190	11900
	N	mm	4760	4760	4760	5950	5950	5950	7140	8330	8330	9520	9520	10710	10710	11900	11900	13090	13090
	HA	mm	2780*	3970	3970	3970	3970	4760	4760	5950	5950	7140	7140	8330	8330	9520	9520	10710	10710
	HE	mm	3970	4760	4760	4760	4760	5950	7140	8330	8330	9520	9520	10710	10710	11900	11900	13090	13090
NRB weights	A	kg	2260	2320	2800	2870	2910	2970	3490	3630	4110	4230	4670	5510	5760	5910	6390	6520	6600
	E/U	kg	2720	2760	2840	3370	3440	3460	3940	4390	4510	5200	5280	5910	6160	6700	7140	7220	7300
	N	kg	3220	3270	3340	3770	3840	3870	4290	4840	4970	5600	5680	6310	6560	7010	7540	7620	7700
NRB H	A	kg	2550	3130	3200	3240	3320	3970	4040	4700	4820	5340	5620	4610	6660	7340	7420	8040	8120
weights	E	kg	3080	3770	3840	3870	3950	4510	5020	5760	5890	6460	6690	7420	7670	8300	8380	9010	9090

* Depth of the models without hydronic kit or with pumps, for models with buffer tank the depth is 3970mm.



NRB 0800÷3600

Data declared in compliance with EN 14511:2013

Reference conditions:

Cold:	Hot:
Outlet T: 7°C	Outlet T: 45°C
Inlet T: 12°C	Inlet T: 40°C
External air T: 35°C	External air T: 7°C

6.2 The Aermec range for ripening and ageing rooms

After the fermentation phase and before bottling, the wine spends a period of time in the ageing rooms called barrique or barrel cellars (ripening phase).

Ageing in wood containers is a procedure that is usually reserved for the most prestigious red wines that require staying in the wood (from a few weeks to many months and even years) to express their qualities at their best.
Because of what we have just said, the interaction between wine and wood plays an essential role in the complex transformations that are responsible for the development of important components and characteristics to obtain a quality wine.
Apart from the type of container (size, type of wood, volume and provenance), it is necessary to guarantee the correct thermohygrometric conditions in these rooms.
The parameters that need to be checked are:

- Temperature, fundamental to adjust the wine ageing processes.

At high temperatures, the speed of the redox chemical reactions increases together with the risks of excessively quick ageing and coarse results. On the other hand, excessively low values can prevent or at least slow down the product evolution too much. Optimal values, even if changing according to the type of wine, fluctuate between 12°C and 18°C.

- Ventilation, essential since periodical air mass movement allows averting the risk of (high humidity) stagnating air pockets or the stratification of the air present;

- Relative humidity that affects the state of conservation of the wood external surface. The best results are between 75% and 85%. Lower values cause excessive volume losses due to water evaporation, while very high relative humidity favours the formation of encrustations and mould on the surface of the barrels and the walls of the production department.

Château La Dominique barrique cellar

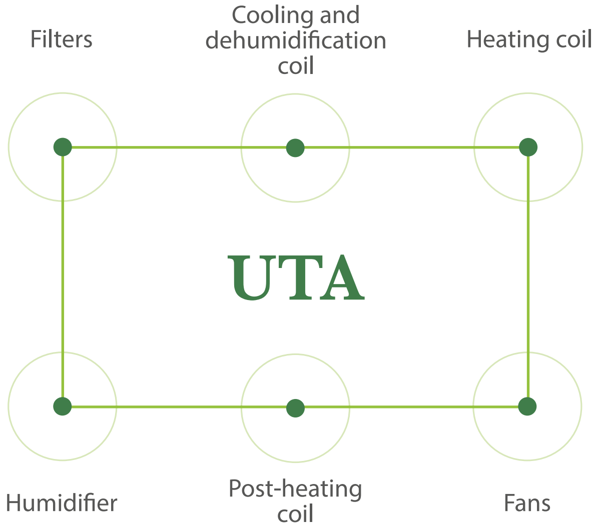
Percentage loss of product according to temperature and relative humidity

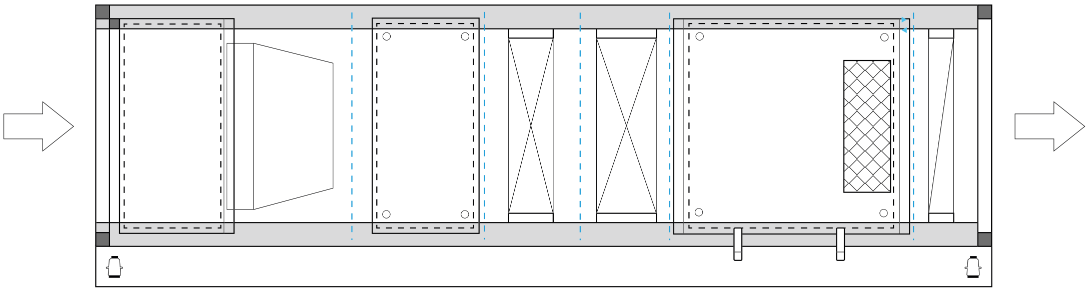
°C	40%	50%	60%	70%	75%	80%	85%	90%	95%
10.0	4,81	4,01	3,25	2,49	2,15	1,77	1,39	1,01	0,63
15.0	7,08	5,96	4,84	3,72	3,16	2,59	2,04	1,46	0,91
20.0	9,10	7,66	6,22	4,78	4,06	3,33	2,51	1,94	1,17

In view of these considerations and with the exception of some cases where the cellar is naturally approaching optimal temperature and humidity values, barrel cellars need the installation of an air-conditioning system that monitors, checks and maintains the set environmental conditions for the whole period that the wine spends there.

Generally sized according to the peculiar features of each individual barrel cellar, systems use fan coil units coupled with a humidification system with micronized water or air handling units.

Inside an air handling unit we can find, according to requirements:



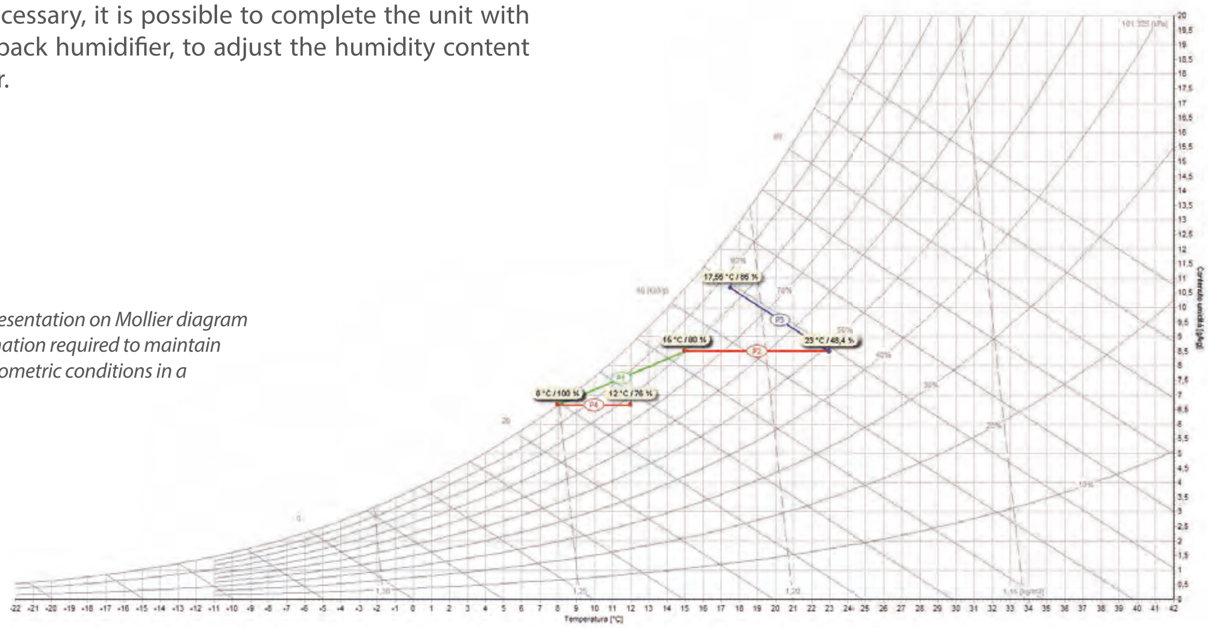


Possible configuration of an air handling unit for barrique cellar

The dehumidification process is performed by the cooling coil that, being supplied with cool enough water (coil temperature lower than the dew point), causes a reduction of the hygrometric content lowering the discharge air temperature at the same time.

To offset this collateral cooling, it is possible to use a post-heating coil that, releasing sensible heat, increases the temperature and reduces relative humidity, leaving absolute humidity unchanged.
Finally, if necessary, it is possible to complete the unit with a steam or pack humidifier, to adjust the humidity content even further.

Example of representation on Mollier diagram of the transformation required to maintain the thermohygrometric conditions in a barrique cellar



Technical data		
	Air flow m³/h	Coil section m²
NCD 1	1134	0,13
NCD 2	1958	0,22
NCD 3	2390	0,27
NCD 4	3132	0,35
NCD 5	3823	0,42
NCD 6	4307	0,48
NCD 7	5257	0,58
NCD 8	6207	0,69
NCD 9	8019	0,89
NCD 10	9477	1,05
NCD 11	11548	1,28
NCD 12	14213	1,58

Technical data		
	Air flow m³/h	Coil section m²
NCD 13	16978	1,89
NCD 14	19742	2,19
NCD 15	25761	2,86
NCD 16	30772	3,42
NCD 17	37139	4,13
NCD 18	47187	4,8
NCD 19	49235	5,47
NCD 20	55283	6,14
NCD 21	61331	6,81
NCD 22	67379	7,49
NCD 23	73427	8,16
NCD 24	79475	8,83

Performance refers to an air speed through the coils equal to 2.5 m/s.

With the components described, it is possible to reach the desired temperature and humidity setpoint and send the air treated to all the wine ageing rooms, through appropriately sized ducts.

NCD – Air handling unit

- Flow between 1,000 and 105,000 m^3/h
- 50mm double panelling
- Panels can be in stainless steel
- Double suction centrifugal fans
- PLUG FANs with inverter adjustment
- Wide range of sections and components
- New selection software with ErP 2016 verification
- Availability of electronic adjustment
- Customised solutions
- Temperature precise control
- Relative humidity precise control
- Wide availability of filters
- Tailor-made coil sizing
- Possibility of pack or steam humidification
- New PVC droplet separator
- High efficiency heat recovery units

NCD series air handling unit

The range is completed by thermoventilation units designed for less air flow that can be integrated in more complex systems guaranteeing flexibility and thermal power.

TUN

- Flows from 900 to 4,000 m^3/h
- Coils with 4 and 6 rows
- Possibility of fitting inverter fans
- Wide availability of accessories

TA

- Flows from 900 to 5,000 m^3/h
- Coils with 4 and 6 rows
- Structure with sandwich panels and polyurethane in-between
- Wide availability of accessories

TN

- Flows from 3,000 to 23,000 m^3/h
- Coils with 4 and 6 rows
- Statically and dynamically balanced pulleys
- Sandwich panels with 25mm insulation

TUN

			10	15	20	25	40	10P	40P
Cooling capacity with:									
4-row coils (1)	Total	kW	4,7	9,3	12,5	16,5	23,3	4,7	26,4
	Sensible	kW	3,6	6,6	8,7	11,4	16,3	3,6	18,2
6-row coils (1)	Total	kW	6,2	11,1	14,1	18,5	26,6	6,2	29,4
	Sensible	kW	4,4	7,6	9,8	12,7	18,5	4,4	20,1
Water flow									
4-row coils		l/h	804	1599	2141	2832	4002	804	4536
6-row coils		l/h	1072	1910	2420	3184	4572	1072	5051
Pressure drop									
4-row coils		kPa	3	16	33	33	60	3	56
6-row coils		kPa	9	34	20	20	37	9	28
Heating capacity with:									
4-row coils (2)	Total	kW	11,2	19	24,9	32,3	46,7	16,6	51,1
6-row coils (2)	Total	kW	12,5	21,1	27,5	35,4	52,2	18,5	56,1
4-row coils	Total	kW	5,5	9,3	12,1	16	25,9	6,4	30,8
6-row coils	Total	kW	6,1	10,5	13,6	17,6	28,9	7,2	34,8
Water flow									
4-row coils		l/h	978	1663	2183	2831	4089	978	4475
6-row coils		l/h	1097	1849	2410	3101	4573	1097	4909
Pressure drop									
4-row coils		kPa	4	13	24	24	46	4	41
6-row coils		kPa	7	24	15	14	28	7	20
Heating capacity with 2 suppl. rows		kW	7	11,7	15,3	20,5	27,9	7	31,8
Water flow		l/h	609	1026	1339	1792	2444	609	2786
Pressure drop		kPa	4	7	7	10	17	4	10

TA

Mod.TA			9	11	15	19	24	33	40	50
Rated air flow		m^3/h	900	1100	1500	1900	2400	3300	4000	5000
		l/s	250	306	417	528	667	917	1111	1389
Useful static pressure (1)		Pa	110	277	249	223	165	215	220	163
Cooling capacity with 4-row coils (2)	Total	kW	4,7	5,7	8,7	12,4	17,3	21,7	27,2	31,8
	Sensible	kW	3,5	4,2	6,2	8,3	11,2	14,3	18,0	21,3
Cooling capacity with 6-row coils (2)	Total	kW	5,4	6,7	11,7	15,5	20,6	26,3	33,5	39,6
	Sensible	kW	3,9	4,7	7,5	9,8	12,8	16,6	20,9	25,0
Cooling capacity with direct expansion 4-row coils R-410A (3)	Total	kW	6,6	7,3	11,0	14,2	19,2	23,0	30,5	34,5
	Sensible	kW	4,2	4,7	7,0	9,1	12,1	14,8	19,4	22,3
Heating capacity with 4-row coil (4)		kW	14,2	16,6	23,9	30,8	40,6	52,2	65,8	78,3
Heating capacity with 6-row coil (4)		kW	15,7	18,5	26,6	34,2	44,3	58,0	72,6	87,5
Heating capacity with 1-row water coil for 4-tube system (8)		kW	5,2	5,7	9,2	11,4	15,9	18,3	25,2	27,7
Heating capacity with 2-row water coil for 4-tube system (8)		kW	8,4	9,5	14,2	17,9	24,3	29,9	38,9	44,9
Heating capacity with 4-row coil (5)		kW	5,5	6,4	9,3	12,1	16,0	20,6	25,9	30,8
Heating capacity with 6-row coil (5)		kW	6,1	7,2	10,5	13,6	17,6	23,0	28,9	34,8
Heating capacity with 1-row water coil for 4-tube system (5)		kW	2,2	2,4	4,0	4,9	6,9	7,9	10,9	12,0
Heating capacity with 2-row water coil for 4-tube system (5)		kW	3,6	4,1	6,2	7,8	10,6	13,0	16,9	19,5
Electrical coil capacity		kW	4	6	8	10	12	16	20	24
Number of electrical coil stages		n°	2	2	2	2	2	2	2	2
Electrical coil supply			400V-3-50Hz							
Fans		n°	1	2	2	1	1	2	2	2
Motors		n°	1	2	2	1	1	2	2	2
Fan total input power		W	357	713	713	886	874	1771	1771	2892
Fan total input current		A	1,6	3,1	3,1	3,9	3,8	7,7	7,7	12,4
Fan supply			230V-3-50Hz							
Poles		n°	2	2	2	4	4	4	4	4
Flat filter efficiency (6)			G4	G4	G4	G4	G4	G4	G4	G4
Pocket filter efficiency (6)			F6	F6	F6	F6	F6	F6	F6	F6
Level of sound power (7)		dB(A)	63	66	67	72	74	75	76	79
Connections										
Coil manifolds		Ø inc.	1"	1"	1"	1"	1"	1"	1"	1"
Direct expansion	IN	Ø mm	16	16	16	16	16	16	16	16
Coil pipes	OUT	Ø mm	22	22	22	22	22	22	22	22
Condensate discharge		Ø inc.	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4

(1) At the rated capacity with 4-row coil
(2) Incoming air temperature 27°C d.b. 19°C w.b.; water temperature (In-Out) 7-12°C
(3) Incoming air temperature 27°C d.b. 19°C w.b.; average evap. temp. 2°C
(4) Incoming air temperature 10°C; Water temperature (In-Out) 70-60°C
(5) Incoming air temperature 20°C; Water temperature (In-Out) 45-40°C
(6) In compliance with the EN 779 standard
(7) Sound power in compliance with UNI EN ISO 9614-2 regulations
(8) Incoming air temperature 15°C; Water temperature (In-Out) 70-60°C

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				TN1	TN2	TN3	TN4	TN5	TN6	TN7	TN8
Maximum air flow	1		m³/h	3000	4100	5650	7350	9300	11700	15500	20000
Maximum air flow	2		m³/h	3500	4700	6400	8000	10000	13400	17800	20000
Maximum air flow	3		m³/h	3500	4700	6400	8400	10900	13400	17800	23000
Useful static pressure											
Fan maximum	4	Basic unit	Pa	215	235	236	226	156	193	207	131
	4	Enhanced unit	Pa	390	407	458	454	340	438	396	381
Cooling capacity with 4-row coils	5	Total	kW	15,6	21,3	29,1	38,1	44,8	56,7	74,7	96,4
		Sensible	kW	10,7	14,7	20,1	26,2	33,3	41,7	55,1	70,9
Cooling capacity with 6-row coils	5	Total	kW	20	27,4	37,7	49,2	58,3	74,5	98,9	127,8
		Sensible	kW	13,4	18,3	25,2	32,8	41,1	51,8	68,8	88,5
Cooling capacity with 4-row coils	6	Total	kW	18,9	25,8	35,3	46,3	56,1	70,7	93,3	120,2
		Sensible	kW	12	16,4	22,4	29,3	37,5	46,9	62,1	79,8
Cooling capacity with 6-row coils	5	Total	kW	23,9	32,9	45,3	59,2	71,6	90,6	120,3	155,1
		Sensible	kW	15	20,5	28,3	36,9	46,4	58,3	77,4	99,6
Heating capacity with 2-row coils	7		kW	25,2	34	46,8	61,5	84,4	103,8	138	178,5
Heating capacity with 3-row coils	7		kW	33,5	45,6	62,7	82	110,8	137,3	182,5	234,4
Heating capacity with 4-row coils	7		kW	40	34,5	74,9	97,6	131,1	162,9	216,1	277,3
Heating capacity with 6-row coils	7		kW	48,7	66,6	91,5	119,2	157,5	196,8	260,4	334,1
Heating capacity with 2-row coils	8		kW	14,7	19,8	27,3	36	49	60,3	80,1	103,8
Heating capacity with 3-row coils	8		kW	19,6	26,6	36,6	47,9	64,4	79,8	106,1	136,3
Heating capacity with 4-row coils	8		kW	23,4	31,9	43,7	57	76,3	94,8	125,8	161,4
Heating capacity with 6-row coils	8		kW	28,5	38,9	53,5	69,6	91,7	114,3	151,7	194,6
BATTERIES											
2-row manifold diameter			Ø inc.	1"	1"	1"	1"	1"	1"1/2	1"1/2	1"1/2
3-row manifold diameter			Ø inc.	1"	1"	1"	1"	1"1/2	1"1/2	1"1/2	1"1/2
4-row manifold diameter			Ø inc.	1"	1"	1"1/2	1"1/2	1"1/2	1"1/2	1"1/2	2"
6-row manifold diameter			Ø inc.	1"	1"	1"1/2	1"1/2	1"1/2	1"1/2	2"	2"
Condensate discharge diameter				1"M- 3/4"F	1"M- 3/4"F	1"M- 3/4"F	1"M- 3/4"F	1"M- 3/4"F	1"M- 3/4"F	1"M- 3/4"F	1"M- 3/4"F
FAN											
MOTOR											
Electrical supply			V/n°/Hz	400V/3/50Hz							
Power/Poles (Basic unit)			kW/n°	0,75/4	1,1/4	1,5/4	2,2/4	4/4	4/4	4/4	5,5/4
Power/Poles (Enhanced unit)			kW/n°	1,1/4	1,5/4	2,2/4	3/4	3/4	5,5/4	5,5/4	7,5/4
FILTERS											
Flat filter efficiency	9			G4	G4	G4	G4	G4	G4	G4	G4
Compact filter efficiency [accessory]	9			F7	F7	F7	F7	F7	F7	F7	F7
Mouth sound pressure	10		(dB)	52	54	55	57	56	58	59	64

(1) With cooling coil
(2) With heating coil, basic version unit
(3) With heating coil, enhanced version unit
(4) At maximum air flow, with 4-row cooling coil and G4 dirtying filters average life
(5) Incoming air temperature 27°C d.b. 19°C w.b.; water temperature (In-Out) 7-12°C
(6) Incoming air temperature 27°C d.b. 19°C w.b.; water temperature (In-Out) 5-10°C
(7) Incoming air temperature 10°C; water temperature (In-Out) 70-60°C
(8) Incoming air temperature 10°C; water temperature (In-Out) 45-40°C
(9) In compliance with the EN 779 standard
(10) d = 10 m, Q = 2, basic version, at minimum head, rated flow with cooling coil

The system is completed by piping (consisting, if in full view, by two galvanized steel sheets separated by a 2 ÷ 4cm cavity filled with insulating material) to suck the air to be treated and releasing into the room the treated air, provided with the pressure required to guarantee correct ventilation. The number of pipes, their length and position, as well as the number and position of recovery and delivery vents, will depend on the room size and configuration.

7.0 Management and control

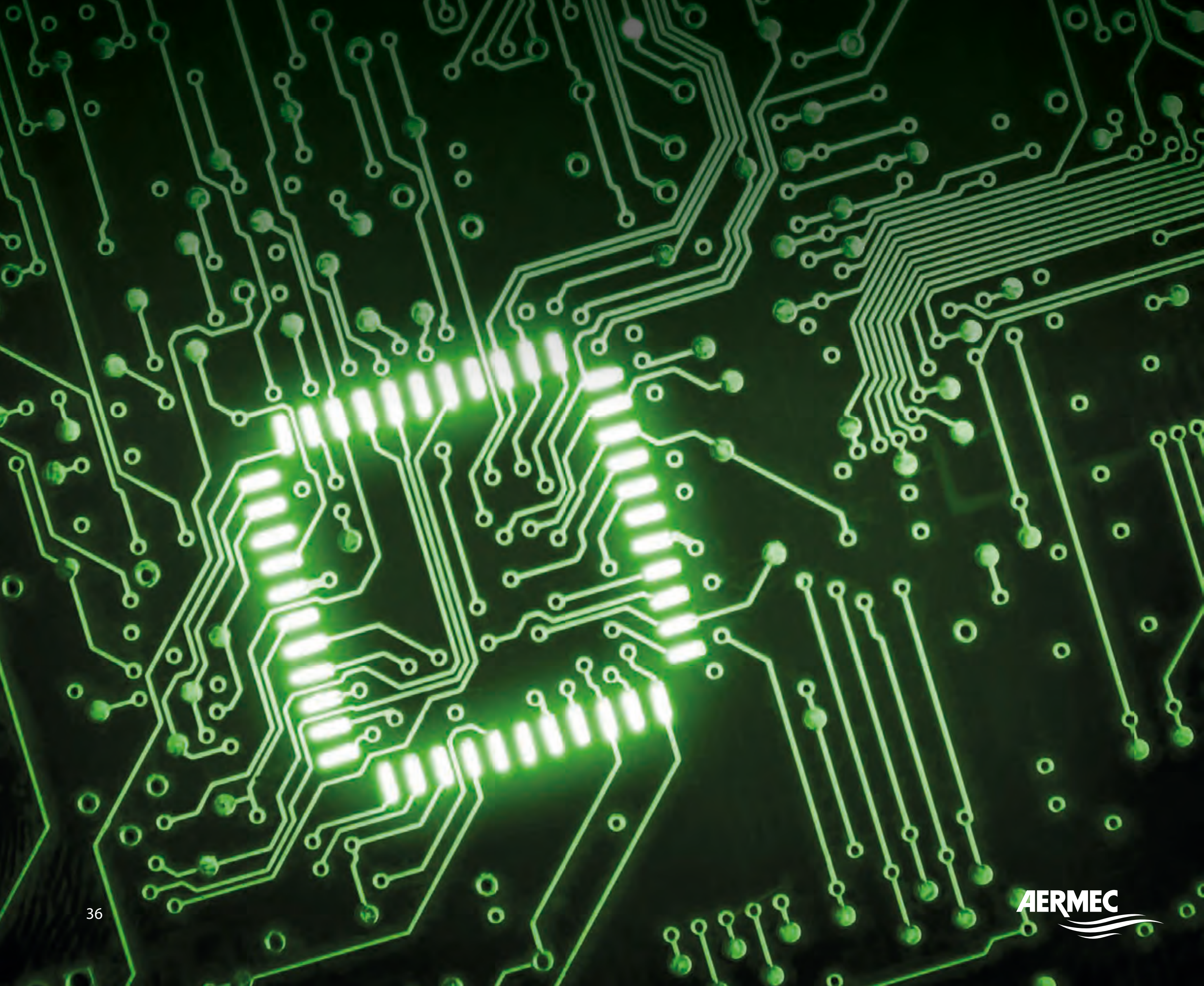
The remote management systems offered by Aermec can manage and supervise locally, in a centralized way, as well as remotely, every system component:

AERNET.
The device allows the control, the management and the remote monitoring of a chiller (with maximum 6) with a PC, smartphone or tablet using Cloud connection. Also, with a simple click is possible to save a log file with all the connected unit datas in the personal terminal for post analysis.

MULTICONTROL.
Allows simultaneous management of up to 4 units, fitted with MODUCONTROL and installed in the same system. For a more complete operation, it is possible to combine Multicontrol with other accessories of the VMF system.

MULTICHILLER.
Allows controlling and switching on and off the individual chillers in a system where multiple units are installed in parallel, ensuring the constant capacity of the evaporators.

VMF.
Allows controlling, locally or in a centralized way, every individual component of a hydronic system. It is ideal in reception areas, tasting rooms and offices.



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8.0 Case history Domaine Thibert: enlargement of a winery in Burgundy

The purpose of the "THIBERT project" is to increase the surface of the buildings used for vinification and ageing (new storage spaces for the tank, barrel and bottle areas, tastings and guided tours) by 700 m^2. The customer needs to replace the old heating/cooling geothermal system fitted with horizontally installed sensors, with an air-water reversible heat pump system.

The new heat pump allows obtaining:

- Heating and cooling the building used to store the finished product;
- Heating and cooling the vinification tanks;
- Wine cold tartaric stabilisation.

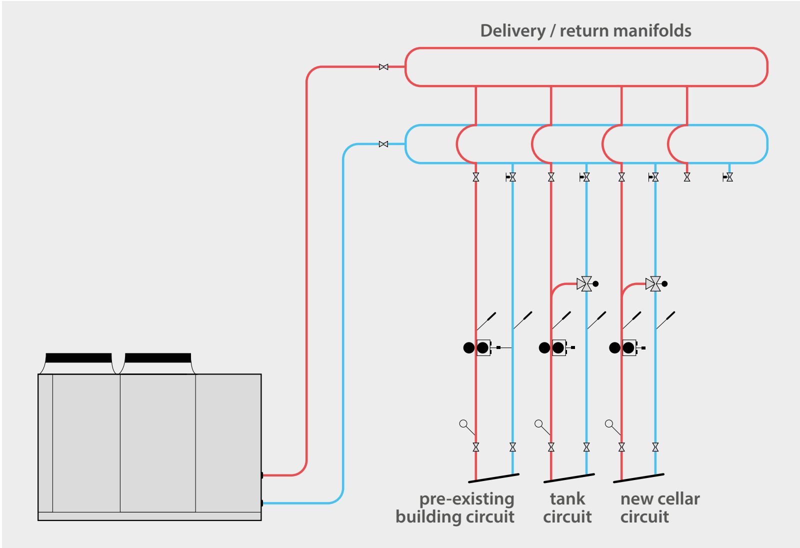
Therefore, from a facility point of view, the system must be able to meet the increased production requirements, adapting to the pre-existing installation at the same time.

As to the tank heating/cooling system, the restraints taken into consideration by the designers were the following:

- Increase of the tanks total capacity: 2500 hl at full performance;
- Temperature necessary for tartaric stabilisation (negative);
- Compact and silent machine.

Vinification room

8.1 Aermec solution



Principle functional diagram

The system consists of a reversible air-condensed heat pump supplying three sub-circuits:

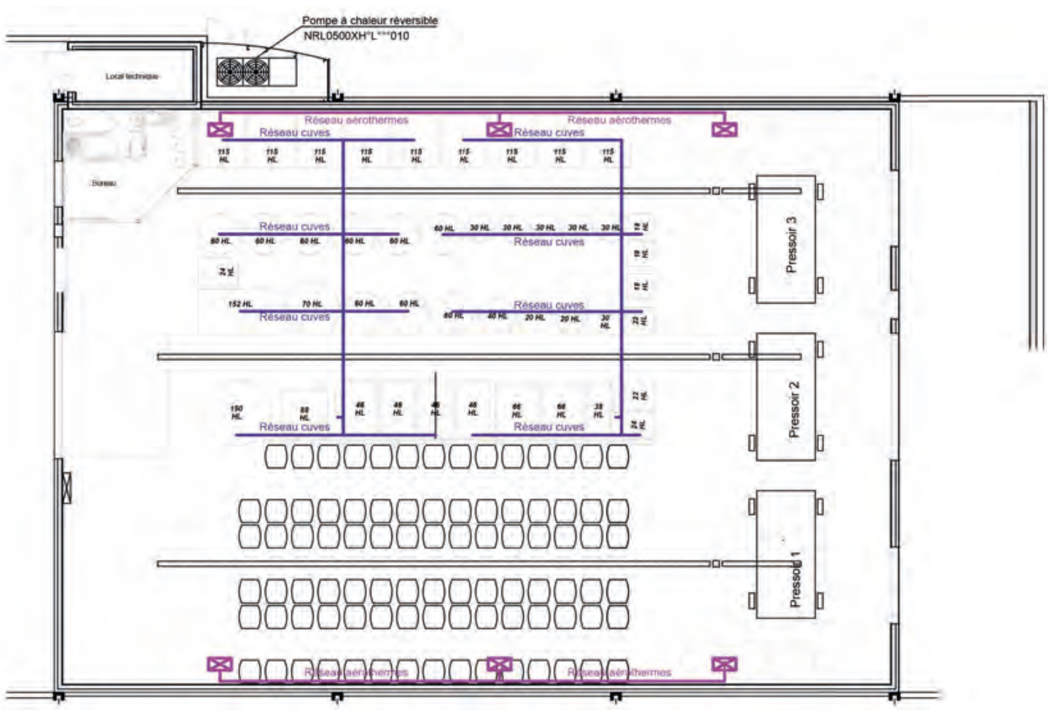
- A circuit connected to the existing network to heat the pre-existing building (circuit connected to an air handling unit);
- A heating circuit for the new cellar (connected to an air handling unit as well);
- A circuit dedicated to vinification.

The heat pump is fitted with three scroll compressors and two independent cooling circuits (with R410A fluid).
The two-circuit solution guarantees the necessary system reliability.

The hydronic system is of the double ring type, so that sub-systems with obviously different requirements can be independent. The heat pump has been selected Low Noise, to meet the rigorous acoustic restraints of the site.

Find below the machine technical details:

- Cooling capacity: 62 kW (with produced cooled water temperature of 0°C and Δt of 5°C; external air temperature 32°C);
- Heating capacity: 60 kW (with produced cooled water temperature of 45°C and Δt of 5°C; external air temperature -7°C).



New cellar layout

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8.2 Aermec pilot systems

Ponte al Masero winery - Merlara (PD) Italy

Located in the vineyard area of the Merlara plane, the Ponte al Masero farm was born from the deep passion and respect characterizing the Bisin family in their dedication to wine production.

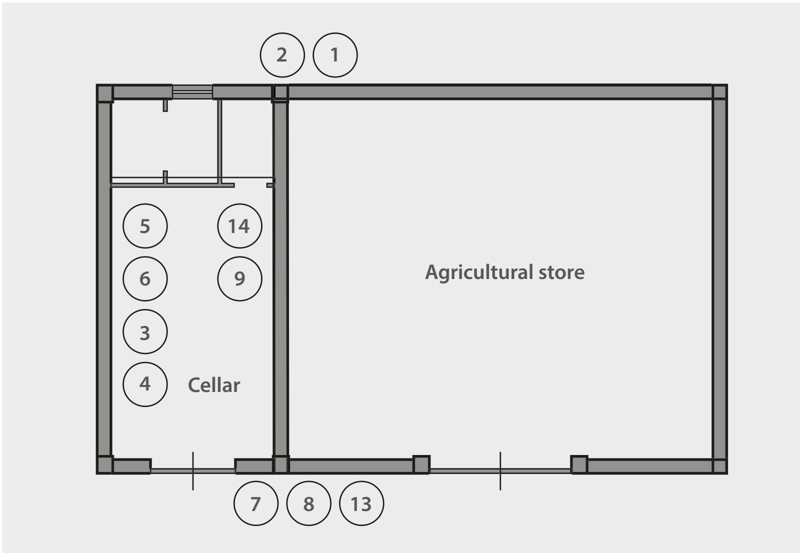
To meet the producer's requirements, Aermec has realized the cooling system supplying not only the machinery but also in-depth consultancy with regard to facilities.

In particular, the customer's requests were:

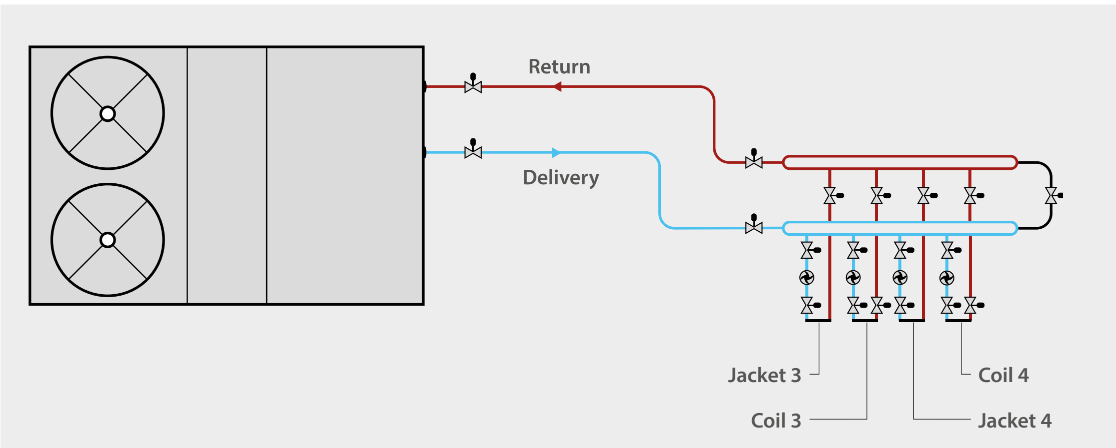
- Integration with the existing cooling system;
- Heat pump to control fermentation;
- Control of the two energy-intensive tanks;
- Must chilling on entering;
- Remote control.

The system has been equipped with an air-water heat pump with double thermostatic valve (to obtain different setpoints), manifolds connected by a calibrated bypass to obtain a double hydraulic ring and, finally, 4 circulators for the 4 users.

Vats 3 and 4, located at the end of the line, are the most energy-intensive tanks where the oenologist chills and maintains the fermentation.



Ponte del Masero cellar layout



System diagram

Chilling

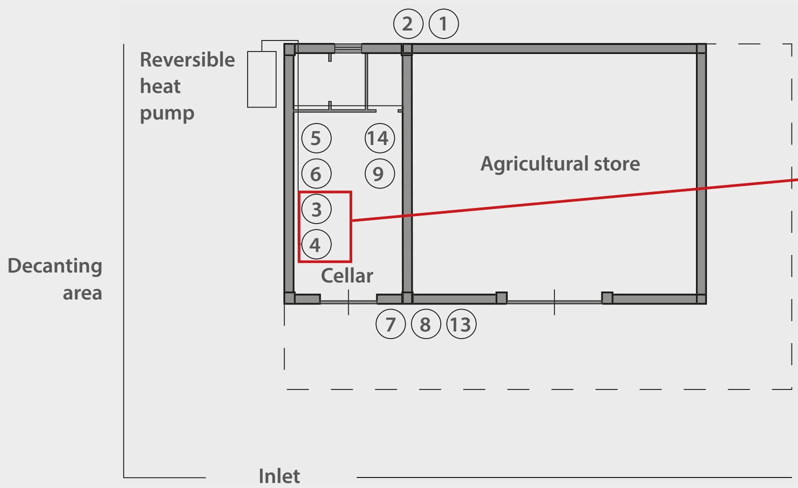
- Must to be chilled: 2500 litres
- Inlet T = 32°C
- Final T = 19°C
- Cooling time: 4 hours

$$Q = \frac{m \cdot c_p \cdot \Delta t}{\Delta \tau} \quad [kW]$$

"Q = cooling capacity [kW]
m = must mass to be chilled [kg]
cp = must specific heat (3,58 kJ/(kg °C))
Δt = initial and final temperature difference [°C]
Δτ = cooling time [s]"

The cooling capacity does not depend on the production capacity of the whole winery but by the capacity of the primary conveyor. From the calculations made, the cooling capacity required equalled 8 kW

Maintaining fermentation



The choice of machine was determined by the quantity of must to be treated (100 hectolitres), the temperature (19°C), the time required for fermentation and the heat loss through the tank walls according to the following formulas:

$$P_{fe} = \frac{E_{spe} \cdot r \cdot 100}{\Delta \tau} \cdot \sum_{j=1}^{n} V_j \quad [kW]$$

$$P_{dis} = A_{lat} \cdot U \cdot \Delta t \quad [W]$$

E_{spe} = Specific heat energy developed by a litre of must [kJ/l];
r = filling factor (0.8);
Vj = Capacity of the j-th tank [hl];
P_{fe} = fermentation heat load [kW]
Δτ = time required for fermentation [s].

P_{dis} = Heat lost by the tank walls [W]
A_{lat} = Side area [m²];
U = Total thermal transmittance [W/(m² °C)];
Δt = Temperature difference between product and environment [°C].

From the calculations made, the maintaining capacity required equalled 4.5 kW.
The unit chosen for this pilot facility was an ANK050 HA YY.

This is the performance of the selected unit:

- Cooling capacity: 10,81 kW
  (Tout = 7 °C; ΔT = 5 °C; Tamb = 40 °C);

- Heating capacity: 9,75 kW
  (Tout = 45°C; ΔT = 5 °C; Tamb = -5 °C).

Because of the possibility of setting the second cold set to -10°C, 35% of propylene glycol is provided for.

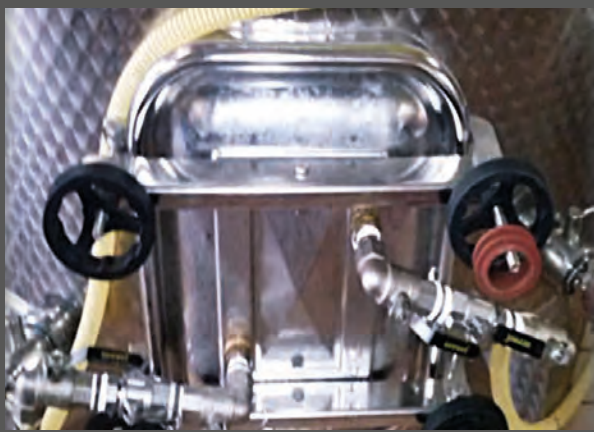
For the tanks, some horizontal heat exchangers have been adopted:

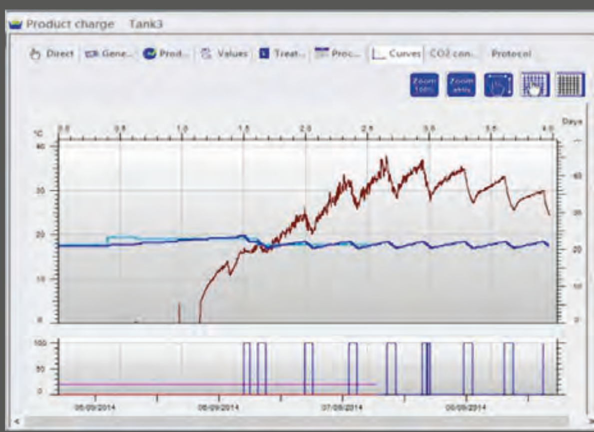
- Designed for tanks provided with hatches;
- In view of the insertion mode, ideal to block any start of spontaneous fermentation;
- With quick fittings for increased safety and to prevent losses of glycol.

Apart from the system components, it is necessary to install adjustment systems that can monitor, in real time, the process taking place in the vats; temperature and CO_2 concentration must be checked.

Once these values are obtained, the following can be obtained as output:

- Progress of the product temperature
- Heat pump setpoint
- Progress of CO_2 concentration
- Feeding pump activation





Heat pump, exchanger and control installed in the cellar

Tre Pioppi farm - Bevilacqua (VR) Italy

The pilot facility of the Tre pioppi farm is used by Aermec to test in-depth the solutions to be proposed to operators in the wine-making sector. In particular, the system of the experimental winery consists of:

- Heat pump
- Vertical heat exchanger
- Glycol water storage tank
- Inverter pump on the secondary circuit
- Two motorized valves
- Monitoring and control system
- System totally in stainless steel

Everything monitored from the office with Aermec's AERNET system.

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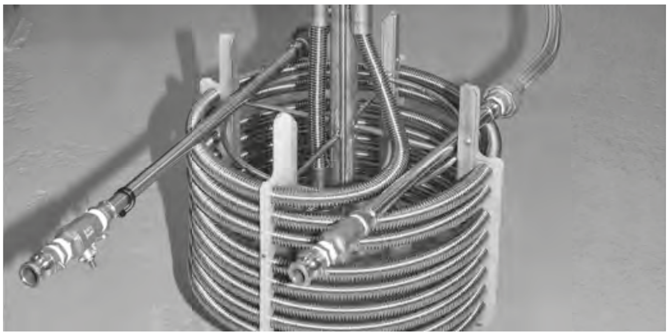
The main points in the customer's requests were:

- Control of 400 litres of must
- No cavity in the tanks
- No monitoring system
- System with low operating pressures

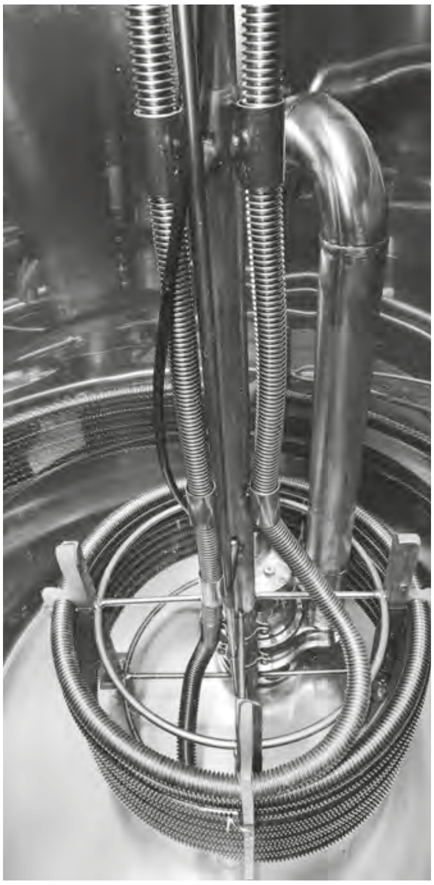


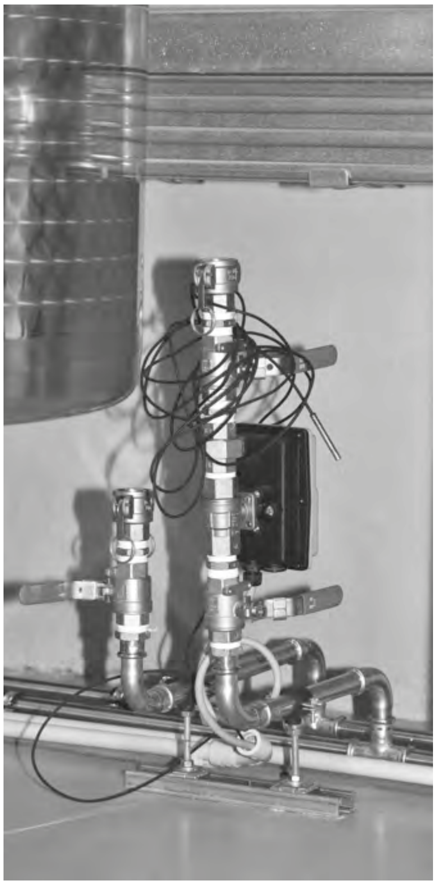
Coil heat exchanger used to control the fermentation temperature.

For the tank, a vertical exchanger was selected, sized so that it would chill the temperature of the must at inlet, fitted with:

- Single corrugated pipe (no welds)
- Integrated sensor pocket in stainless steel
- Support feet in food grade material
- Two-way motorized valve for temperature control
- Quick-fit couplings to allow moving the exchanger
- Stainless steel hoses

The unit installed is an ANK020 heat pump with double thermostatic valve to allow a double setpoint that can be set via an external switch.





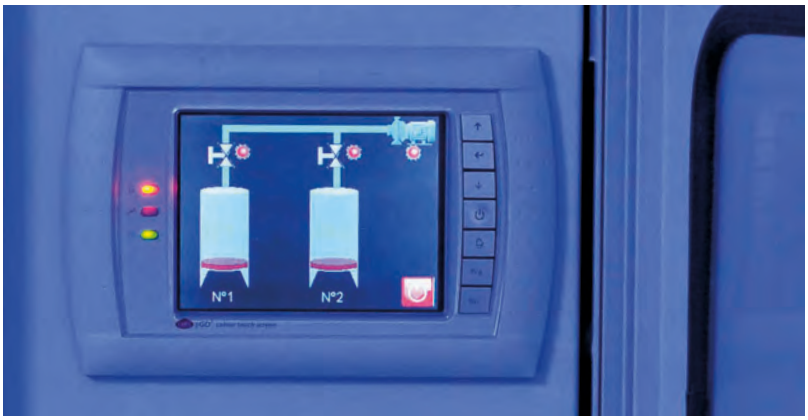
As to management and control, a user-friendly interface was used that allows setpoint modification, pump switch-off on the secondary circuit and placing the valve in the off position

Setpoint
changing switch

*ANK020HAYY
heat pump*

Experimentation with this type of system allows:

- Meeting the customer's requirements
- Energy savings
- Possible tartaric stabilisation
- Possible system remote control
- Increase of know-how in the sector
- Possibility of transforming hls into kWs: ability to match each phase with the corresponding energy demand



References

When it comes to the vinification process or air conditioning of interiors, Aermec is the supplier of choice to leading wineries around the globe, who value the reliability offered by Aermec solutions and a highly qualified team always on hand to provide prompt support.

Italy

PIEDMONT

Conterno Giacomo,
Monforte d'Alba (CU)

TRENTINO ALTO ADIGE

Cantina Vivallis,
Nogaredo (TN)

TUSCANY

Ornellaia,
Castagneto Carducci (LI)

Tenute Loacker - Corte Pavone,
Montalcino (SI)

VENETO

Speri Viticoltori,
Pedemonte (VR)

Worldwide

CANADA

Robin Ridge Winery,
Keremeos (British Columbia)

FRANCE

Château Cheval Blanc,
Saint-Émilion (Aquitaine)

Château Smith Haut Lafitte,
Bordeaux Martillac (Aquitaine)

PORTUGAL

Aveleda,
Penafiel (Porto)

SLOVAKIA

Elesko,
Modra (Bratislava)

SOUTH AFRICA

Ladismith Cellar,
Ladismith (Western Cape)

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