

EDITION 2022



# USE, MAINTENANCE AND WARRANTY GUIDE



**COOLING SYSTEMS**

## INDEX

<b>PRELIMINARY NOTES</b> .....	3
<b>DEFINITION</b> .....	4
<b>IDENTIFICATION</b> .....	5
<b>TECHNICAL DESCRIPTION OF PRODUCT TYPES</b> .....	6
<b>OPERATING CONDITIONS</b> .....	11
<b>PERFORMANCE</b> .....	11
<b>AIR TEMPERATURE</b> .....	11
<b>SPEED SETTING</b> .....	11
<b>FAN SYSTEMS START UP</b> .....	12
<b>NOISE LEVEL</b> .....	12
<b>CORROSION RESISTANCE</b> .....	12
<b>SAFETY INSTRUCTIONS AND GENERAL WARNINGS</b> .....	13
<b>UNINTENDED AND PROHIBITED USE</b> .....	13
<b>MECHANICAL SAFETY</b> .....	14
<b>ELECTRICAL SAFETY</b> .....	14
<b>RISK IDENTIFICATION</b> .....	15
<b>PPE PERSONAL PROTECTIVE EQUIPMENT AND DANGERS</b> .....	15
<b>WARNING SIGNS</b> .....	18
<b>RECEIVING AND INSPECTION</b> .....	20
<b>HANDLING</b> .....	20
<b>STORAGE</b> .....	25
<b>INSTALLATION</b> .....	26
<b>COLLECTORS</b> .....	26
<b>HYDRAULIC CONNECTIONS</b> .....	27
<b>FAN SYSTEM OR IMPELLER FIXING</b> .....	28
<b>DISTANCE AND POSITIONING OF IMPELLER AND FRAME</b> .....	28
<b>ELECTRICAL CONNECTIONS</b> .....	29
<b>AIR FLOW AND DIRECTION OF ROTATION</b> .....	29
<b>OPERATING INSTRUCTIONS</b> .....	30
<b>START UP</b> .....	30
<b>FULL OPERATION</b> .....	31
<b>MAINTENANCE</b> .....	31
<b>ORDINARY MAINTENANCE</b> .....	32

<b>CLEANING OF THE FINNED PACK HEAT EXCHANGERS .....</b>	<b>33</b>
<b>LUBRICATION.....</b>	<b>35</b>
<b>REFRIGERANT .....</b>	<b>36</b>
<b>ETHYLENE GLYCOL AS REFRIGERANT FLUID .....</b>	<b>36</b>
<b>TROUBLESHOOTING .....</b>	<b>36</b>
<b>SPARE PARTS .....</b>	<b>38</b>
<b>DISASSEMBLING INSTRUCTIONS.....</b>	<b>38</b>
<b>DISPOSAL .....</b>	<b>38</b>
<b>LEGAL NOTES .....</b>	<b>39</b>
<b>CONTENT AND UNDERSTANDING OF THE GUIDE .....</b>	<b>39</b>
<b>RESPONSIBILITY .....</b>	<b>39</b>
<b>MANUFACTURER RESPONSIBILITY.....</b>	<b>39</b>
<b>DESIGNER AND INSTALLER RESPONSIBILITY .....</b>	<b>40</b>
<b>OPERATOR RESPONSIBILITY.....</b>	<b>41</b>
<b>RELEVANCE OF EN 378 STANDARDS .....</b>	<b>41</b>
<b>WARRANTY.....</b>	<b>42</b>

## PRELIMINARY NOTES

Read carefully and be sure thoroughly understand all the information provided in these instructions before planning and carrying out any handling, assembling, disassembling, positioning and commissioning operation involving the product supplied by WingFan S.r.l.

The product shall be used exclusively according to its intended use, as specified in this paragraph.

WingFan S.r.l. declines any responsibilities for injuries to people or damages to property resulting from failure to comply with the instructions in this document.

As the preliminary notes are an essential part of the guide, they must be read with great care and fully understood.

This guide may be integrated with further indications and partly modified for the benefit of customization, or non-standard operating conditions.

Keep this guide throughout the entire life-cycle of the product.

Pay great attention to the norms of use provided in this guide, since failure to observe them may damage the product, the property and/or harm people or animals.

WingFan S.r.l. reserves the right to modify this guide at any time.

The text of the latest edition is available through website [www.WingFan.it](http://www.WingFan.it).

Make sure to be in possession of the latest edition by consulting the footer.

The product complies with the Essential Health and Safety Requirements laid down in the Machinery Directive 2006/42/EC, which apply to all the contemplated standard use conditions, or to those agreed with the customer.

Non-original spare parts have to be previously approved by WingFan S.r.l.

Any other use, unless agreed between WingFan S.r.l. and the customer before designing and delivering, is explicitly forbidden.

Improper use of the cooling system may cause dangerous conditions, for which WingFan S.r.l. takes no accountability.

Use of refrigerant fluids different from those explicitly indicated is prohibited.

The use of substances and fluids that may deteriorate, make unsafe or diminish the performance is forbidden.

WingFan S.r.l. must be immediately contacted in the following cases:

- Changes are necessary, or it is necessary to carry out a variation to the product after it has been manufactured, but before its start-up.
- The operating conditions of the installation site are not the ones expected.
- A difference between what was established before manufacturing and the actual state of the installation exists.
- In any case before carrying out any modification work.

Failure to do so will relieve WingFan S.r.l. from any accountability.

Project designers, installers and/or users are required to enforce local norms and regulations concerning installation, use and disposal of the product.

Wherever not better specified in this guide, the term “qualified personnel” or “operator” always indicates any duly informed person, or any person under the supervision of a worker having such training, knowledge and experience to carry out the work properly and allow the supervised person to perceive the risks and avert any related hazard

For warranty conditions refer to the terms agreed at the stage order and/or to the specific paragraph of this guide.

This guide may not be reproduced, either totally or partially, unless the WingFan S.r.l. gives its authorization in writing.

## DEFINITION

This guide is intended for more or less complex cooling systems and it's necessary to know their components.

They can be made up of one or more cooler cores, assembled with carpentry, fan systems, expansion tanks, thermostats and electrical cabinets based on their complexity.

The impellers can be operated mechanically (by means of belt pulley), directly from an engine or from an electrical/hydraulic motor (this last case represents a fan system).

The WingFan S.r.l. cooling systems are made to be installed inside the plant/machine of the final customer who must declare the conformity to all the mandatory standards before the start up.

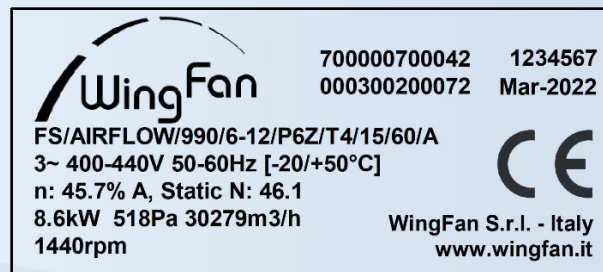
## IDENTIFICATION

All products are provided with an identification label on which is indicated:

- Article p/n
- Description of product
- Date and lot of production
- Customer's code (if provided) or drawing No.
- Power supply, if electrical motor is provided



Below is the identification label for fan systems (if supplied) on which is indicated:



- Article p/n
- Description of production
- Date and lot of production
- Customer's code (if provided)
- Power supply
- Energy efficiency data according to directive 2009/125/EC

The user must ensure that the labels applied on the products are in good condition, readable and properly secured in place.

The labels have to be considered as a part of the product.

The standard labels applied are in adhesive plastic.

Labels different from standard have to be defined and agreed during design phase.

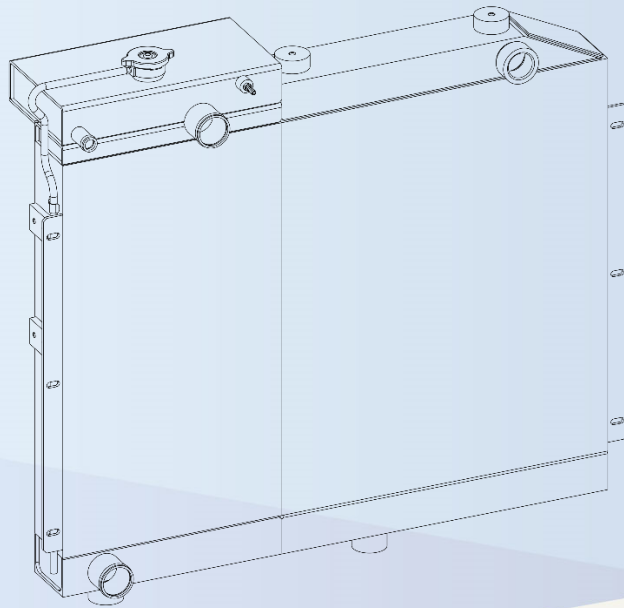


## TECHNICAL DESCRIPTION OF PRODUCT TYPES

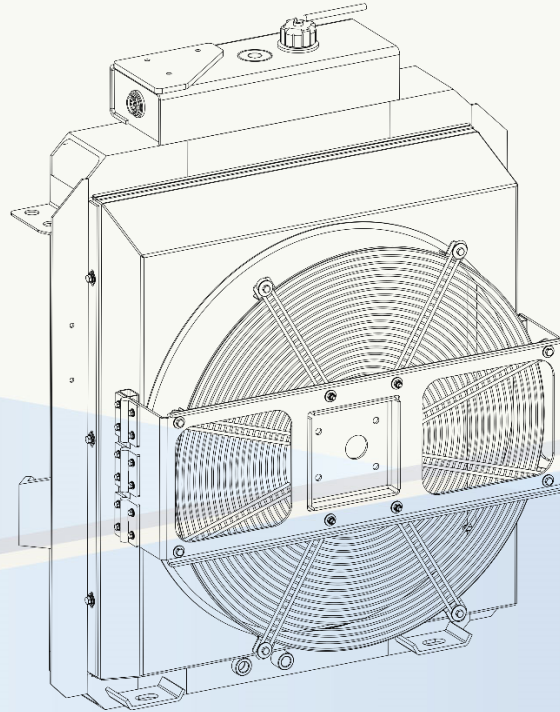
WingFan S.r.l. designs and manufactures a wide range of cooling systems for several applications, e.g. for engines on agricultural and construction machinery, for Gen-Set engines, in HVAC and transportation sector and for industrial applications.

Products can be supplied in different configurations:

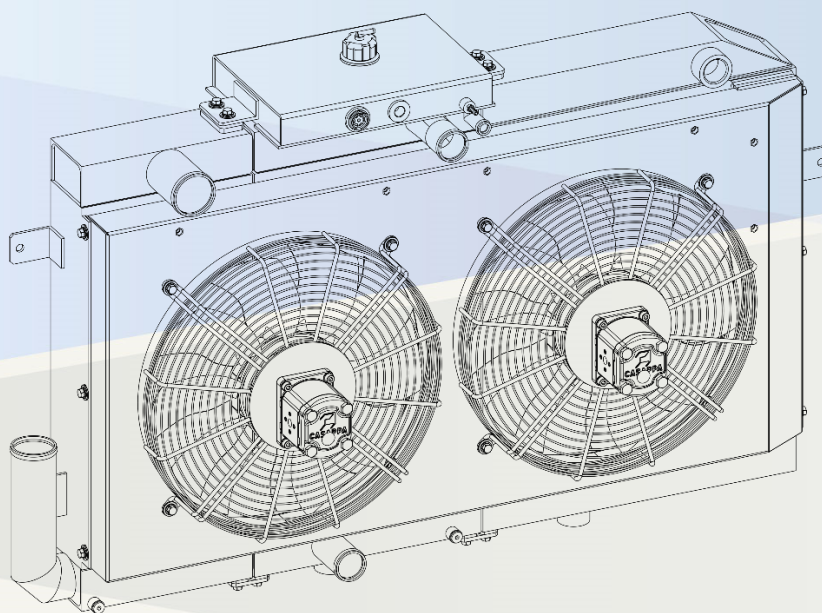
*Cooling system with one or more cooler cores,  
self-supporting to be assembled on an external structure*



*Cooling system with cooler core, nozzle, protection guard and impeller to be assembled to the drive system*

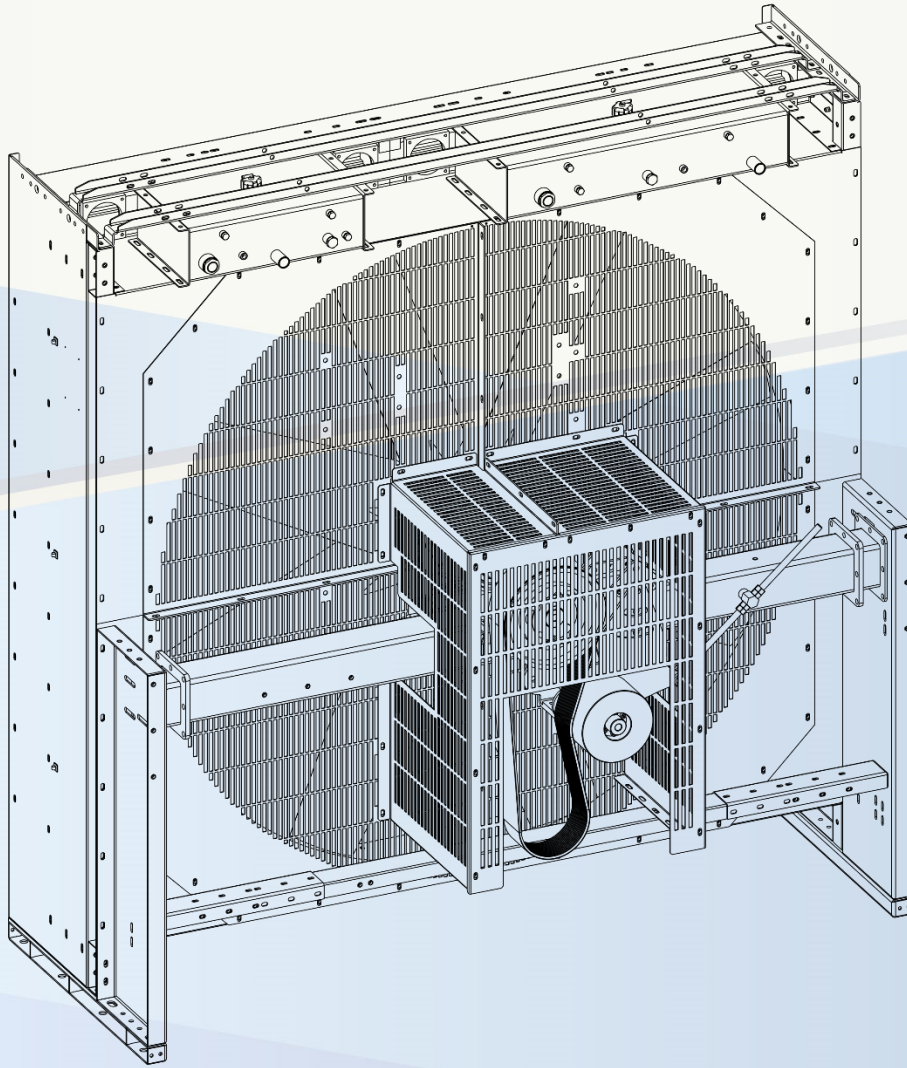


*Cooling system with one or more cooler cores, nozzle, protection guard and impeller driven by hydraulic motor*

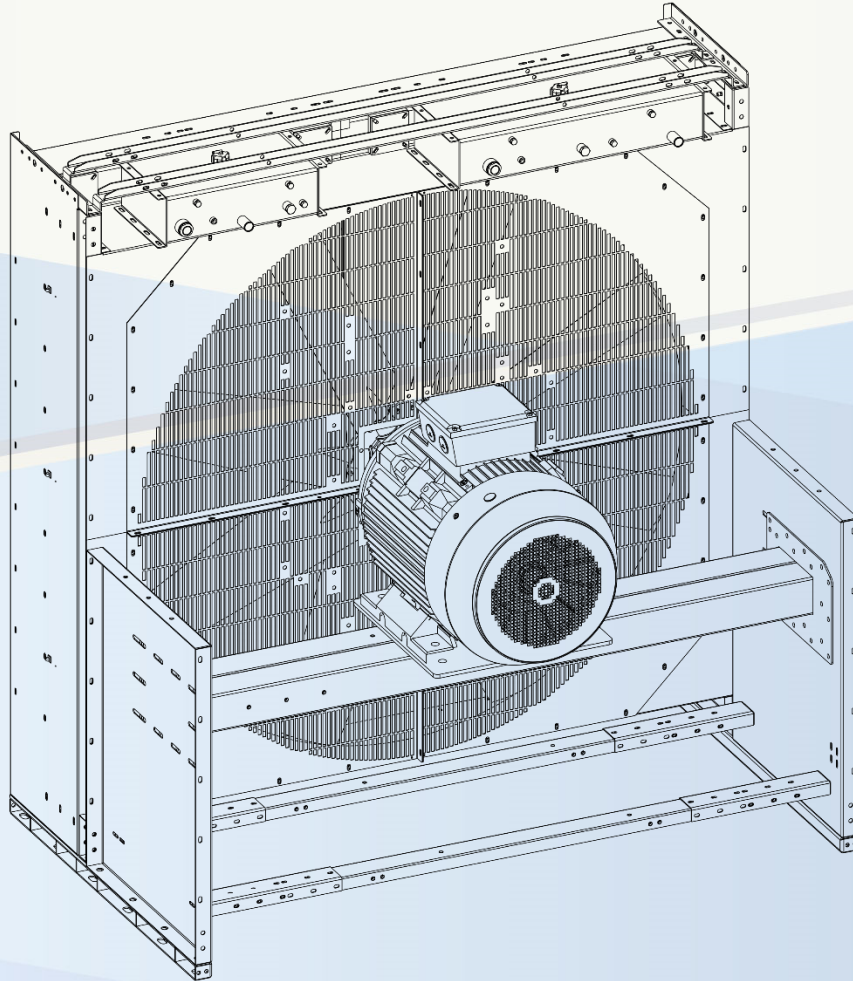




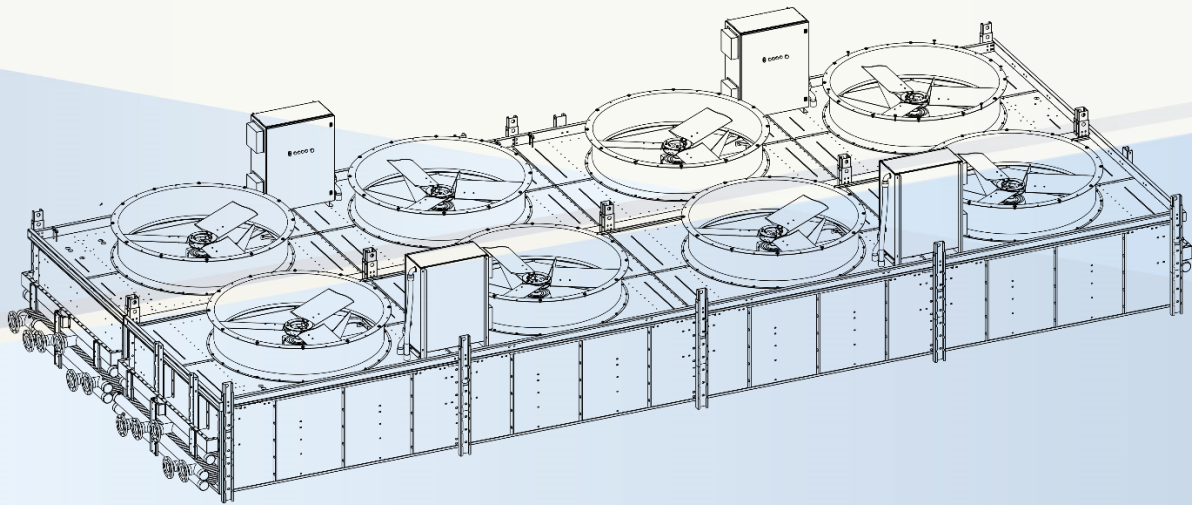
*Cooling system with one or more cooler cores, nozzle, protection guard and impeller driven by a belt and pulley transmission (vertical installation of the cooling system)*



*Cooling system with one or more cooler cores, nozzle, protection guard and impeller driven by motors  
(vertical installation of the cooling system)*



*Cooling system with one or more cooler cores, nozzle, protection guard and impeller driven by motors. It can be supplied with inverters for speed regulation installed inside electrical cabinets (horizontal installation of the cooling system)*



## OPERATING CONDITIONS

The cooling systems described in this guide are designed and manufactured to convey liquids, air or similar gases. Therefore, they mustn't be used to convey solid substances or particles suspended into the conveyed fluids.

Operating conditions have to comply with those which the cooling system was designed for.

Below the standard conditions for the operation.

### PERFORMANCE

Performance of cooling systems are carefully examined during design phase.

The technical documentation provided before manufacturing the product is meant as guideline and has to be checked and approved by the final customer.

The set of performance parameters is derived from theoretical conditions and is in accordance with the standard tests performed, e.g. in wind tunnel, for which every parameters will be reviewed and validated based on actual operating conditions of the product.

The customer is responsible for the performance check during the plant/machine start up and full operation.

Differences between design values and experimental measurements made are allowed.

### AIR TEMPERATURE

Air temperature is a basic variable for the correct operation.

The temperature range on which the product can and must operate is established during design phase.

Exceeding this range can limit the performance and damage components.

In case the motors are provided, check the working temperature indicated on motor or fan system labels.

### SPEED SETTING

Rotation speed of the fan systems is established during design phase. During start-up and operation, it must comply with the specification.

Exceeding the defined speed can cause impeller broke and/or breakdown of other components.

In case of motor drive solution, check the type of electrical connection, the voltage and the frequency are correct (always check the label on fan systems).

When using speed regulators such as inverters, always check the motors were suitable (in case of doubt contact WingFan S.r.l.), pay attention to the temperatures reached by the windings and check for anomalous induced noise.

## FAN SYSTEMS START UP

Fan systems must work only with balanced impellers. Anomalous vibrations indicate that the impeller is not correctly balanced or is not perfectly centered inside the nozzle.

Impellers are balanced accordingly to norm ISO 21940-11:2016.

During fan systems start-up, the operator must ensure there isn't any contact among the impeller and the other components.

During the check, the operator must take all the necessary precautions to guarantee adequate safe conditions.

## NOISE LEVEL

During design phase, if required, the noise level value of the product (in decibel dB) is identified.

The values are obtained through lab measurements and/or calculations of the impellers only related to standard test conditions in accordance with norm EN ISO 3744:2010.

The noise values provided by WingFan S.r.l. are meant as guideline.

The detection of the actual noise level of the product installed at the workplace is borne by final customer.

In case the noise level exceeds the limit allowed by mandatory standards, the operator must wear suitable protection devices and the area must be equipped with signals to recommend their use.

In case the customer wants to install a silencer on the fan system, it's always necessary to inform WingFan S.r.l. to verify the suitability.

## CORROSION RESISTANCE

WingFan's products are produced to operate in the standard atmosphere.

The presence of possible corrosive substances should be indicated in the order.

The protection level of the steel parts, accordingly to norm EN ISO UNI 1944:2017, must be defined during design phase, as well as the protection level of the fan systems.

The final customer must inform about the corrosivity category (C1, C3, C5...) that must be suitable for the installation site of the product.



## SAFETY INSTRUCTIONS AND GENERAL WARNINGS

Product maintenance and installation must be done by qualified personnel. Below the instructions to be followed:

- During installation and maintenance, power must be off.
- During the transportation, lifting, installation and maintenance of the products protective gloves should be worn to prevent possible cuts and injuries.
- The tubes and collectors must not be touched while heat transferring is in process.
- The min/max temperature and pressure values of the liquid must be considered and followed.
- The workers are responsible for operating safely during installation, lifting, transportation, operation and maintenance.
- It is customer's responsibility to make sure that the product is compliant with the safety norms corresponding to its usage and according to the laws in force of the Country where it is installed.

If the fan system or the impeller is supplied:

- If it's necessary to change the impeller while operating, the motor or the drive system must be off.
- Before installation of the product, impeller must be checked by running idle.
- Long hair, ties and similar objects must be kept away from the fan system air flow.
- The fan system must be put into operation after proper installation and equipped with the suitable protections to avoid access, even accidentally, to electric and moving parts.

Please contact WingFan S.r.l. in case of unexpected problems.

### UNINTENDED AND PROHIBITED USE

Any different use from that specified in this guide is to be considered as unintended.

While the cooling system is in operation, no activities are allowed near it, unless they take place at a suitable distance.

Below is a list of foreseeable unintended uses:

- Failure to disconnect the power supply by turning the power switch to position "On" (open) or to disconnect the plug from the socket before performing adjustment, resetting and maintenance operations.
- Failure to carry out periodical maintenance and controls.
- Structural modifications or changes to the operating logics.
- Tampering with the protections and safety systems.
- Presence of unauthorized people during routine operation.
- Failure by operators and maintenance people to wear personal protective equipment.
- Failure to install the recommended collective protective equipment.

The behaviours illustrated above are explicitly prohibited.



Since it is not possible to eliminate residual risks due to unintended use, indications and instructions are provided to avoid such conduct.

It is prohibited to remove or make unreadable the safety, danger and obligation signs featured on the product and/or the machine where it's installed.

It is prohibited to remove or tamper with the protections.

It is forbidden to make changes.

## MECHANICAL SAFETY

The product must be secured to a support capable of resisting the stresses occurring during normal operation, such as the weight of the product fully assembled and filled with refrigerant, the effects of a seismic shock and the snow or wind load, besides normal application, at the installation site.

The stability of the product has to be safeguarded. Products that operate on a flat surface must be fastened to this surface and not just made to sit on it.

Based on the type of application, hung up products may require the adoption of fall-prevention or retaining systems.

If bracing is necessary, it must be placed and/or marked in such a way as not to generate a risk of tripping.

During maintenance, repairs or cleaning, always wear suitable protective equipment (gloves resistant to mechanical risks, as prescribed by standard EN 388, marked CE and above resistance level 1311) for the purpose of reducing the risk of injuries in case of contact with sheet metal tips or with the finned pack.

Accidental contact with the manifolds or piping may cause heat burns. Always wear suitable protective equipment.

## ELECTRICAL SAFETY

The motors must be connected exclusively by qualified staff having the qualifications required by the legislation of the Country where the product is going to be installed.

The product is designed to operate within the voltage, the frequency and the current limits indicated on the motor and/or fan system ID plate.

A power switch must be installed upstream of the power line. This switch must give the opportunity to be locked in the open position (power not supplied).

The protection class of the electrical equipment must not be reduced during the installation phase. Consequently, appropriate cable-glands have to be used and, where necessary, plugs for the holes.

The customer must build a proper earthing for motors and other metal parts of the product. Furthermore, the customer must do the necessary checks during installation, start up and operation.

The installation of the product in classified environment such as potentially explosive atmosphere is forbidden pursuant to Directive 1992/92/EC. In case of fire, use an extinguishing substance suitable for use with live equipment.

## RISK IDENTIFICATION

### PPE PERSONAL PROTECTIVE EQUIPMENT AND DANGERS

The risks examined in this guide can be attributed to every cooling system supplied, whatever the model or the application, and they are defined only based upon manufacturing technologies and solutions.

It's necessary to consider the following points:

- The product has risks that have not been totally eradicated from a design point of view or with the installation of adequate protections.
- Besides the instructions given in this guide, the user has to implement organizational measures to further reduce residual risks. These measures include giving operators both personal (PPE) and collective (CPE) protective equipment.
- During installation, sufficient space is contemplated to limit such risks. To preserve said conditions, the corridors and the areas around the product must always be free from obstacles, clean, dry and well lit.
- Before disassembling the product, it is mandatory to check the possible corrosion of screws and lifting eyes. In case of corrosion (even if little), replace screws and lifting eyes.

POTENTIAL DANGER	SOLUTION
<p style="text-align: center;"><b>BURN</b></p> <p>The operator (in particular situation or during maintenance) intentionally or unintentionally touches a hot or frozen surface</p>	<p>Use insulating gloves and/or wait for the cooling down/heating up of the surfaces</p>
<p style="text-align: center;"><b>ELECTROCUTION</b></p> <p>Contact with live electrical parts during maintenance operations</p>	<p>Maintenance operations have to be carried out with the products switched off and exclusively by qualified, trained and authorized operators, supplied with appropriate PPE and insulating tools.</p>
<p style="text-align: center;"><b>SHARP FINS</b></p> <p>During operation or cleaning the operator may come in contact with the fins of the coolers, which are sharp</p>	<p>The operator must have appropriate PPE</p>

## Other danger situations








OPERATION	DESCRIPTION OF THE DANGER SITUATION
<b>TRANSPORT</b>	It consists in transferring the product from one location to another using suitable means
<b>HANDLING</b>	It consists in transferring the product from and onto the means of transport as well as moving it inside the factory
<b>UNPACKING</b>	It consists in removing all the materials used for packaging the product
<b>ASSEMBLING</b>	It includes all the initial assembly operations required to prepare the product for start up
<b>ORDINARY USE</b>	The product must be used in relation to its designing, manufacture and function
<b>ADJUSTMENT</b>	It includes adjustment, setup and calibration of all the devices which have to be registered for normal operation
<b>CLEANING</b>	It consists in removing dust, oil and processing/machining residues that might jeopardize the good functioning and use of the product as well as the operator's health/safety
<b>MAINTENANCE</b>	It consists in periodically checking the product parts that can wear out or that have to be replaced
<b>DISASSEMBLING</b>	It consists in either complete or partly disassembling of the product into its constituting parts
<b>DEMOLITION</b>	It consists in the final removal of all the parts of the product resulting from its final dismantling in order to allow for its disposal or for separate collection of its components in compliance with the procedures laid down by the laws in force

The Customer is responsible for the identification and selection of the adequate type of suitable PPE.

The PPE used must comply with the product directives and bear the CE marking (for the European market).













The customer must delimit the working area by affixing adequate danger signs.







Below the recommended PPE

Obligation	Symbol	Transport	Handling	Unpacking	Assembling	Ordinary use	Adjustment	Cleaning	Maintenance	Disassembly	Disposal
Work clothes											
Safety foot gear											
Gloves											
Safety goggles											
Face shield											
Mask*											
Protective helmet											
* Only for operations requiring contact with refrigerant											

## WARNING SIGNS

Below some danger signs that can be found on the installation sites:

	Harmful chemical
	Low temperature
	Pressure steam pipe
	Toxic
	Fire risk
	Explosion risk
	No smoking
	Hot surface
	High voltage
	Generic caution
	Rotating parts Hazard for hands, long hair and accessories like ties
	Earthing

	Fragile
	Keep dry
	This way up
	Handle with care
	Impeller clockwise rotation
	Impeller counter-clockwise rotation



## RECEIVING AND INSPECTION

All products are carefully checked before delivery to ensure the highest standards of quality. Its customer's responsibility to check that the received products comply with what was ordered and that they were not damaged during transportation.

Once the reception is carried out, WingFan S.r.l. will be responsible only for what indicated in the insurance warranty during commercial agreement.

It is particularly recommended to carry out the following inspections:

- Compare components' codes, descriptions and type with what was ordered and check if they match.
- Check that nothing is damaged and nothing is missing. If any damage or impact is observed on the product, please contact the manufacturer with photos describing the problem encountered.
- Check that there are no other moving parts than those ones designed to be so.
- Check that all fixing screws are well tightened.
- If the fan system is provided, check the impeller rotates without touching other parts and that is properly tightened to the shaft and there aren't any damaged parts.
- All products must always be supplied with their Use and Maintenance Guide and have the technical data label.

In case of doubts, please get in touch with WingFan S.r.l.

## HANDLING

The products have to be handled by expert staff. A wrong handling may cause severe damages. Here below the most common damages that may occur:

- Impeller deformation
- Cooler core deformation or damaging
- Carpentry deformation
- Scratches on paint
- Motor damaging

The products must always be handled into their original packaging and must be taken to the installation area without removing it.

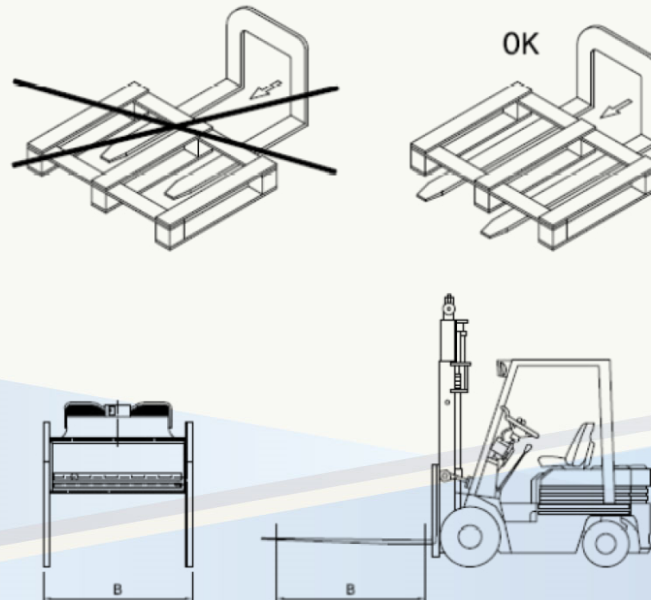
No one should be under the product while lifting, loading and unloading because it may fall down and cause injuries, even deaths.

Always lift the product in vertical position and not in windy weather.

Avoid deformations of the lifting points when handling the product and don't apply acceleration to it during the process.

If pallets and cranes are used for transportation, check the position of the pallet before lifting the product.

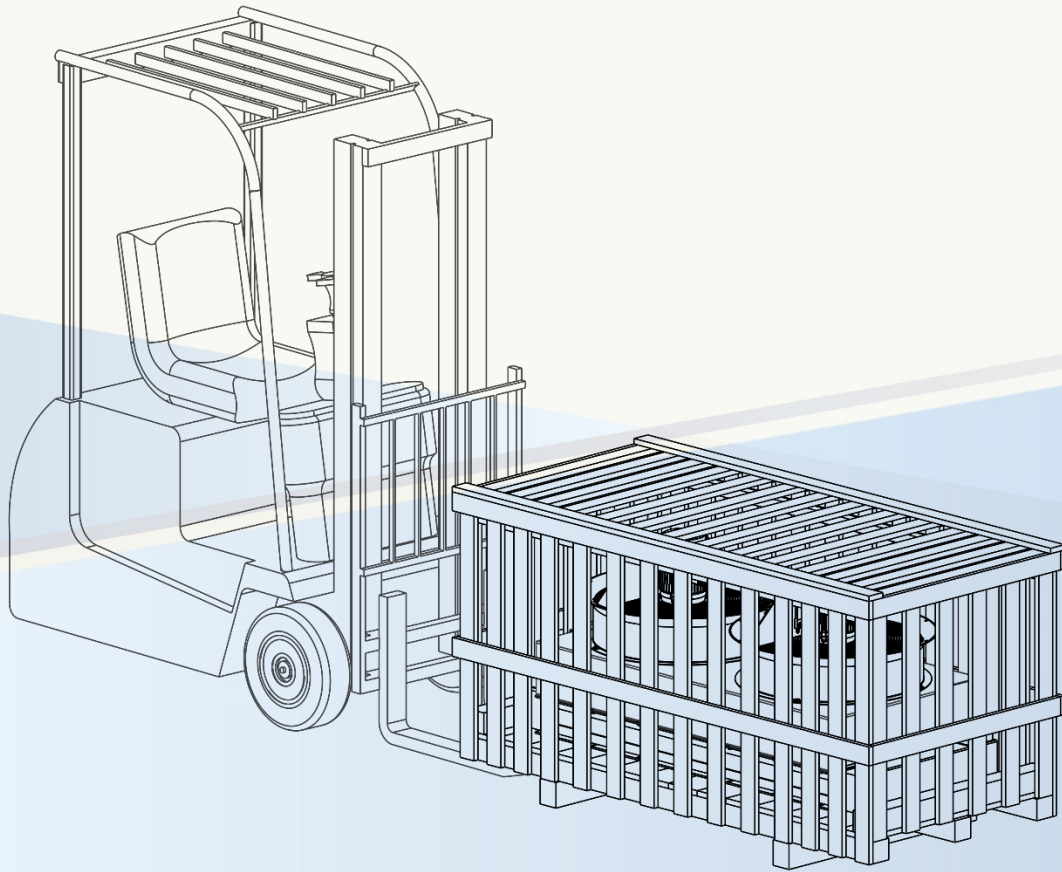
When using the forklift, lifting forks must be well positioned under the pallets, as in the following image.



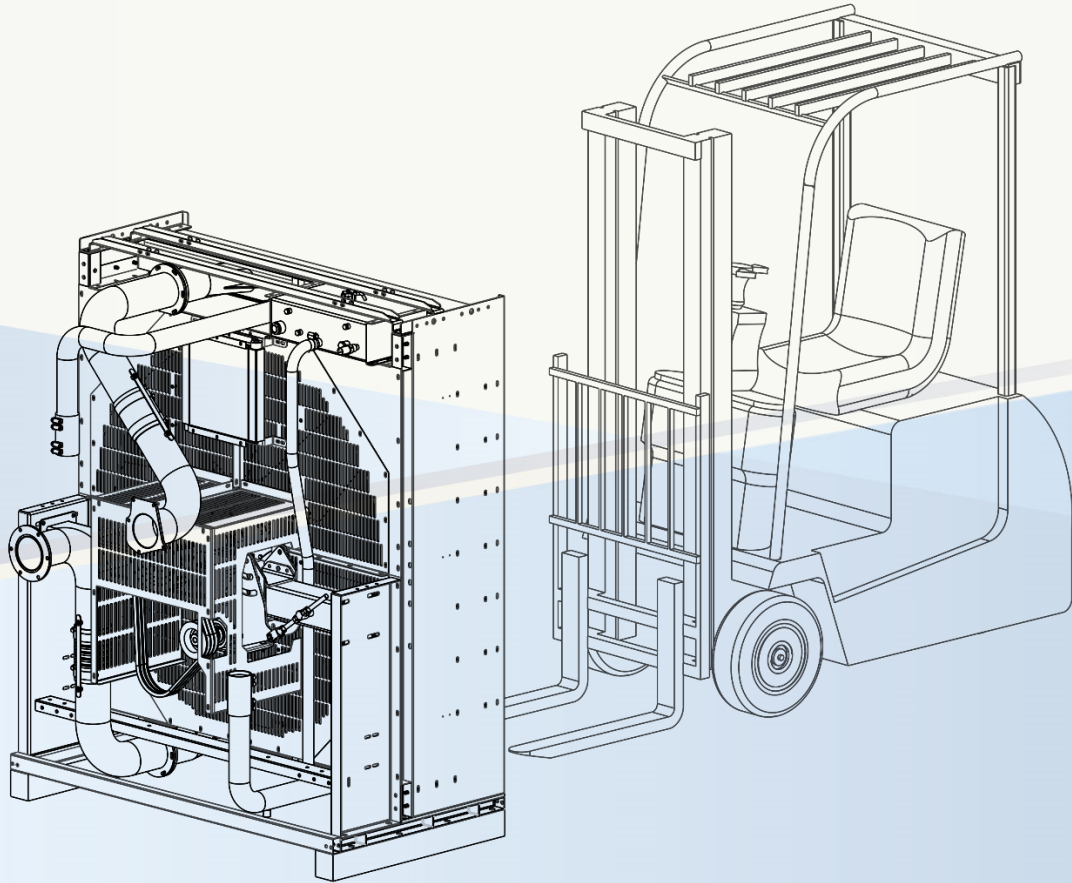
All handling equipment must be chosen according to the weight and the packaging shape of what is going to be handled, the product must be hooked up with appropriate hooks and, if provided in specific documents, only by the points indicated by WingFan S.r.l.

Failure to comply with any of the requirements above and, generally, any conduct posing a risk for the operators involved in the handling, releases WingFan S.r.l. from any and all consequences and liability.

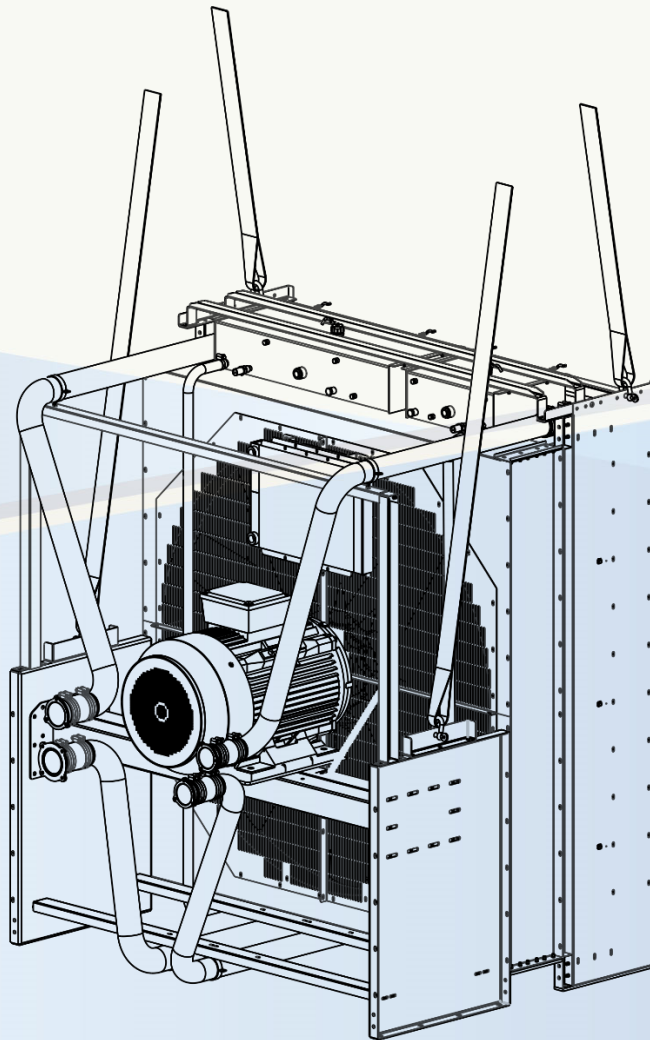
*Handling crates and cages by forklifts.*



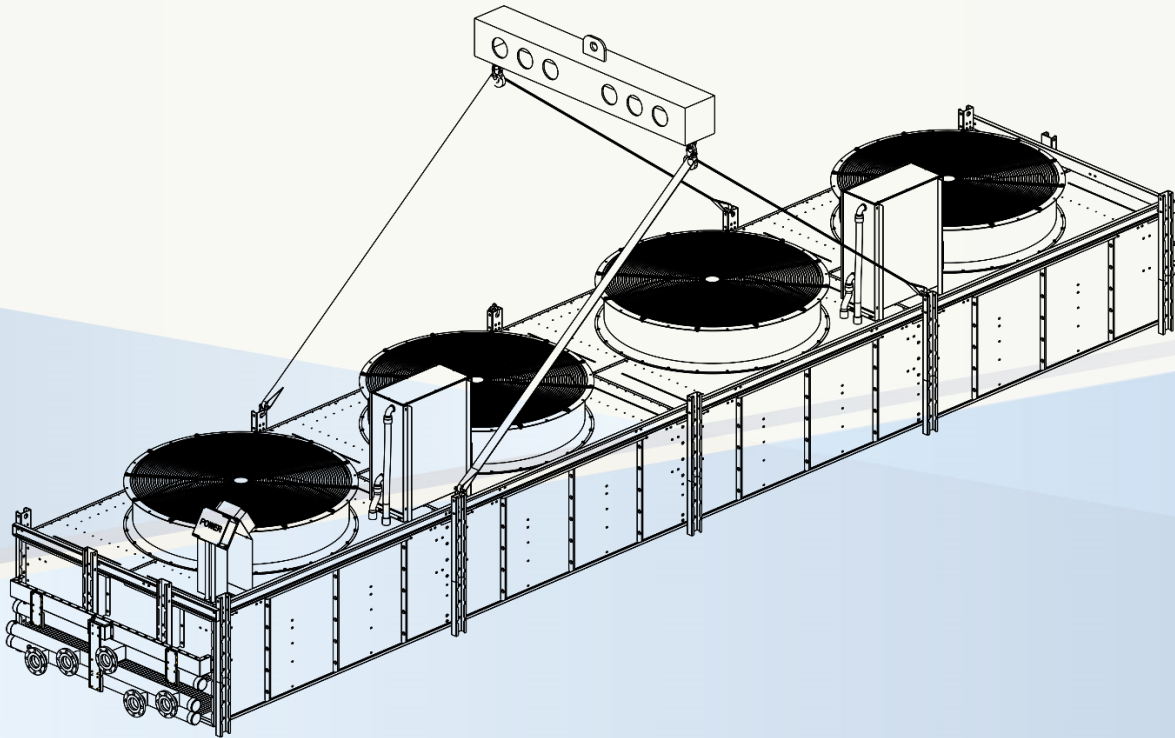
*Handling of a cooling system with vertical installation by forklift.*



*Handling of a cooling system with vertical installation by crane. The webbing slings and shackles must be carefully chosen according to the load to be lifted.*



*Handling of a cooling system with horizontal installation by means of a crane and a lifting beam. The webbing slings, shackles and lifting beam must be carefully chosen according to the load to be lifted.*



## STORAGE

All products are manufactured to be kept on stock in the following conditions:

- Storage temperature at  $-20^{\circ}\text{C}/+60^{\circ}\text{C}$  and relative humidity below 60%.
- Adequate protection against weathering, such as rain and snow, in a suitably airy and heated place in order to avoid condensate or humidity.
- Sometimes rotate the impeller to keep the motor bearings working, if fan system is provided.
- It's advisable to run the impeller for 4-6 hours at least once a week to avoid motor damaging if they aren't installed immediately and the storage temperature is really low.
- Protect the cooler fins from external loads and vibrations and avoid contact with corrosive substances.
- Do not stack one on top of the other unless this is explicitly contemplated.



## INSTALLATION

Installation is the stage that follows product placement, during which operations are performed to secure it to its support, bracing is placed, and parts likely to have been disassembled during handling are reassembled.

Installation has to be performed in conformity to the indications given in the guide and those provided in standard EN 378-3.

The right installation of the cooling system avoids problems during operation and should be done by authorized people:

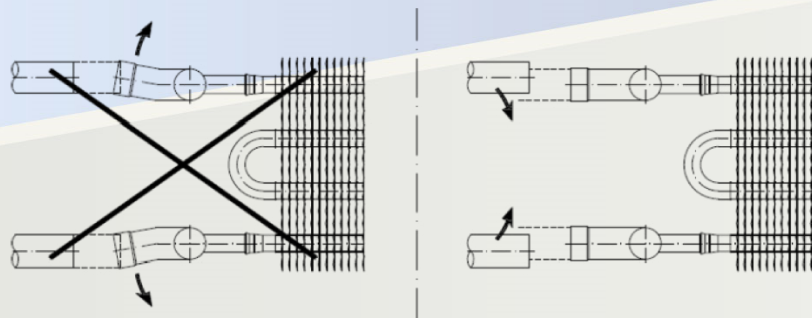
- Before installation, the product must be cleaned from packaging residues.
- During the installation the power must be off.
- Provide earthing of metal parts and electric motors.
- Vacuum the product after installation and wait for a day.
- Solder and welding must be done when the product is not under pressure.
- Condenser and dry cooler exchangers must not be exposed to direct sunlight.

In case of fan system with electrical motor is provided, follow the instruction below:

- The installation of the fan system cannot be carried out in potentially explosive atmosphere.
- The fan system has always to be connected to a ground cable.
- Painted parts do not guarantee a sufficient electrical connection, so they are not suitable as connecting components to earthing.
- The fan systems must be protected from external solid stuff by means of a protection system.
- If not provided in the supply, it's necessary to equip the fan systems with suitable protections according to the EN 294 standard.
- The motor draining holes, if supplied and if necessary, must be open so that any condensation can come out (the condensate occurs during thermic gaps between highly damp air and the contact surfaces).

## COLLECTORS

During the connection of the product to the plant, the position of the collectors must not be changed; even small stretching must be avoided.



Vibration dampers must be installed in compressor line.

Collectors are just for connection. Circumstances like overloads or stresses coming to the collectors must be absolutely avoided.

## HYDRAULIC CONNECTIONS

Adhere to the guidelines listed below for hydraulic connections:

- It is strictly forbidden to modify the position and orientation of the inlet/outlet pipes of the circuits.
- Installation of upstream shut-off valves is recommended for easier maintenance. If installation of these valves creates risks, it is always up to the installer to foresee appropriate solutions for the circuit.
- For the connections of the refrigerating and hydraulic circuits, it is mandatory to comply with the diameters of the existing attachments. Any kind of modification has to be agreed beforehand with WingFan S.r.l., otherwise the manufacturer is relieved from all responsibility for harm to people or damage to property, and for poorer performances than those declared. In such case, even the Warranty Conditions no longer apply.

Hydraulic connections have to be set up in conformity with national or local legislation. The piping can be made of steel, zinc-coated steel or P.V.C. Pipes have to be accurately sized depending on the nominal refrigerant flow rate, pressure, pressure losses from the hydraulic circuit and the operating temperatures. All hydraulic connections have to be insulated by using closed cell material of adequate thickness.

Fasten all the piping correctly to prevent mechanical damage:

- While fastening, support the piping so as to prevent inappropriate stresses to the fastening systems.
- If the cooling system is installed in areas where personnel transit is authorized, place the piping so that it is not in the way, and ascertain that piping is connected with coupling tubes that cannot be easily removed.
- Use fastening devices that are suitable with the weight of the piping so that the whole weight does not fall onto the connections, causing breakage or detachment from the cooling systems.

In products where explosive or flammable liquids are used, incorrect piping installation may lead to the risk of refrigerant leaks.

When the connections are made by soldering, follow the prescriptions listed below:

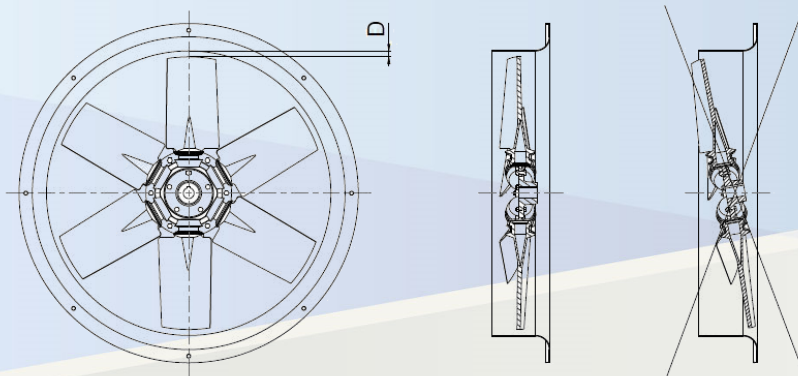
- weld with precision and care to prevent leaks.
- avoid overheating while welding (excessive downsizing danger).
- use protection gases while welding (avoid excessive limescale formation).
- welding work on components under pressure may cause fire or explosions.
- carry out welding work only after emptying the circuit and discharging the pressure from it.
- make sure that loads and vibrations do not stress the product.
- when welding the connections, it is prohibited to direct the flame towards the cooler core and towards the installed electrical system devices.

## FAN SYSTEM OR IMPELLER FIXING

In case of fan systems or impellers supplied separately, during installation pay attention to the points below:

- Fix the fan system on a flat surface, to avoid unsteady positions of the impeller.
- The fan system must be fixed onto a basement or a rigid frame and assembled in a such way to avoid vibrations and resonances.
- Use all the given fixing points.
- When tightening the fixing screws, pay attention not to bend or damage any part of the fan system.
- The impeller must be correctly mounted to the electrical/hydraulic motor or to the belt-pulley system.

## DISTANCE AND POSITIONING OF IMPELLER AND FRAME



Check that the tip clearance (D) in operation between the impeller and the frame is uniform along the circumference to avoid contacts and rubbings between the impeller and the frame and is at least 0.5% of the frame diameter.

## ELECTRICAL CONNECTIONS

If the cooling system is supplied with an electrical motor, use the motor data sheet as reference for the wiring diagram.

Electrical connections have to be made in accordance with the instructions provided in this guide, with the wiring diagrams and with the regulations relating to electrical systems in force in the Country where the cooling system is installed:

- All electrical connections have to be carried out by qualified staff, having the necessary technical requirements expected in the Country where the product is installed.
- It is mandatory to check that the line voltage corresponds to that indicated on the product identification plate.
- The installer is in charge of sizing and selecting the power cable.
- When placing the power cable, we recommend to use raceways or piping to protect the cable mechanically. We strongly recommend not to place the cable on the floor without fastening it.
- It's mandatory to use power cables whose type and minimum cross-section conforms to standard EN 60204-1 and to technical regulations in force in the Country of installation.
- It is mandatory to supply the power system with a device to protect it from over-currents, current peaks higher than the rated value and winding temperatures higher than the indicated class.
- Prepare the passage of the electric cable from the panels to the electric motor boxes, reducing the risk of water infiltrations. Always use cable glands.
- Protection against indirect electrical contacts is implemented by earthing the metal structure of the product and through coordination with automatic switches.
- At the power terminals of the switchboard, the yellow/green earthing cable must be left longer than the other leads so that, in case of pulling, it is the last one to detach from the terminals.
- If several cooling systems are assembled in series, they have to be included in an equipotential system; connection has to be made by means of a terminal bearing the symbol placed on the header side. The cross-section of the lead (colored yellow/green) has to be equal to or larger than the maximum cross-section of the power cable.
- For the electrical connections of the fan systems, it is mandatory to refer to the wiring diagram provided in the junction box of the fans.
- The products provided with electrical motor present the risk of electrocution. Wait 5 minutes after turning off the power before opening the terminal box.
- If the product is provided with a regulation system (speed regulators or EC motors), compliance with standards EN61000-3-2 and EN61000-3-12 must be ensured before connecting the cooling system to the distribution network.
- The choice of the inverter (if not the supplied) must be shared with WingFan S.r.l.
- The installation of an inverter (if not supplied) to drive more than one motor must be agreed with WingFan S.r.l.
- Fix the power cable so as to withstand possible rips.

## AIR FLOW AND DIRECTION OF ROTATION

Look at the arrows on the fan blades for the correct rotation direction of the impeller and check that the air flows in the right direction.



## OPERATING INSTRUCTIONS

Product of WingFan S.r.l. is ready for use only after carefully having followed all the instructions and warnings pertaining its hydraulic and electrical connections (if any) and declared the plant/machine, in which it is installed, compliant with the mandatory reference standards.

### START UP

- Before start to operate, check any deflection. Contact WingFan S.r.l. in case of anomalies.
- Ensure that mechanical connections are connected appropriately.
- All connections must be checked; check for possible leaking and be sure input/output connections are properly assembled.
- Operating pressure values must be within the design limits.
- Operating temperature values must be within the design limits.
- Proper amount of antifreeze must be added for minimum temperature during the working period inside of dry coolers. Corrosion inhibitors must be added with antifreeze to avoid to pipes damaging. Since antifreeze reduces the heat capacity, it should be used only in the freezing seasons. Corrosion inhibitors should be added when the water is demineralized.
- In the dry coolers, to make the product work efficiently and not to damage it, specified water/ethylene glycol percentage must be given in the right amount with pre-made mixture.
- Check that no foreign bodies is present in the impeller area.
- Check that impeller position is correct and the drain holes (if provided) are open.
- Check that the earthing connection is done and verified.
- Check the rotation direction of the impeller and the airflow direction (from the cooler or to the cooler).
- Check the presence of vibrations and/or abnormal noises.
- Check that the power supply voltage and current absorption are correct and not higher than those indicated on the label of the motor and/or of the fan system, if a motor is provided.

If the model is equipped with a speed controller (only for qualified personnel having the necessary technical qualifications, as prescribed by the Country laws where the product is installed):

- It is mandatory to refer to the controller instructions and pay attention while entering the setpoint as the system is live.
- It is prohibited to remove the plastic protection inside the regulator; it is mandatory to wear safety footwear, type S1, bearing the CE marking, in compliance with standard EN345, and to use insulated tools when working on live electrical systems/appliances.

It's customer/installer responsibility to verify all the other workplace safety requirements.

## FULL OPERATION

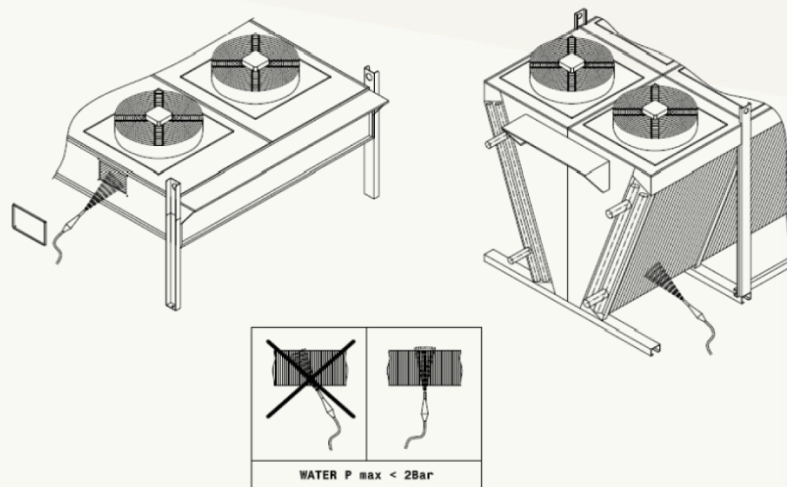
- Plumbing and electrical installation are required to operate the product.
- The product is ready for use when the project-specified operation values are reached.
- In case of standing idle for a long time, the product must operate for 15 – 30 minutes once a week.
- When the impellers are operating, air circulation must not be obstructed.
- To minimize the freezing risk in dry cooler, a proper amount of antifreeze should be used.
- Air pockets must not be present inside the circuit.
- The cooler is hotter than air therefore do not touch it without gloves and wear protective goggles to protect from accidental liquid splashing.
- When the product deviates from given operating conditions or happens any unexpected situation, please contact WingFan S.r.l.

## MAINTENANCE

Regular check and periodic maintenance guarantee correct operation and longer lifetime of the product.

- Maintenance and repairing of the product must be done only by experienced and trained personnel.
- Enclose the working area to allow access only to authorized personnel.
- In case of maintenance and repairing, disconnect the fan system from power supply and wait until all moving parts have stopped before carrying out any inspection. Make sure the cooler and the collectors of the product are neither too hot nor too cold.
- People in charge of maintenance must use the necessary safety equipment.
- Dirt and dust on the surface of the fins must be removed with low pressure water or air in upright position. If water is used for cleaning, be careful not to soak electrical connections, if there are any. Use a neutral detergent specifically made for this job and rinse carefully after the cleaning.
- In case of soldering or welding, empty the product before proceeding.
- Snow and ice removal must be done.
- Check the right tightening of the screws.
- Check the impeller rotates freely on its axis without touching the frame.
- Check there is not any dust or other on the impeller.





**Do not carry out any maintenance program in case of potentially explosive air.**

## ORDINARY MAINTENANCE

Maintenance is fundamental both for safety and proper operation of the product.

Checking and tests must be carried out by qualified personnel.

Maintenance is prohibited before switching off the power supply.

Wait until all impellers have come to a complete stop.

Every month:

- It is advisable to check the finned pack for cleanliness.

Every 3 months:

- Check noise and vibration levels: unusual values may indicate malfunctioning of the system.
- Check for corrosion.
- Clean the machine and above all the impeller to avoid dust accumulation that may cause problems.
- Check the tightening of the screws and their condition.

Every 6 months:

- Check the efficiency of the electrical wiring, earthing system and parts mostly subject to wear (motors, electric heaters, switches, etc.).
- Clean the surfaces of the product using non-aggressive, water-based solutions with compressed air at a max. pressure of 2 bar and at a distance exceeding 200 mm, perpendicularly to the finned pack. Wear proper clothing and protections. After cleaning the finned pack, carry out a visual check to find possible traces of dirt residues or damaged fins.

In case of prolonged shutdowns in humid atmosphere, it is recommended to run the fan system once a week for about two hours in order to evaporate the moisture inside it.

When operating, walking is only allowed on walkable grid.

Placing or leaving any tool on the impeller guard is forbidden.

All maintenance and installation work must be carried out only if the weather conditions are such as to prevent risks to the operator's safety (rain, wind, etc.).

Note: during cleaning, make sure not to affect impeller balance and not to bend cooler fins.

**Never remove any components of the product. In case something is uninstalled, the product conformity will not be valid anymore and it will not be covered by warranty.**

The above schedule for ordinary maintenance is intended as a general guideline and is subject to change because it depends on working conditions such as hours of actual work and air cleanliness. It's therefore responsibility of the maintenance worker of the installation site to arrange the proper schedule.

## CLEANING OF THE FINNED PACK HEAT EXCHANGERS

This paragraph provides guidance on cleaning of finned pack heat exchangers.

The term cleaning does not mean sanitize and disinfect; for these tasks, refer to the mandatory regulations.

Since the cooling system supplied is affected by the passage of air, an undesirable by-product may be the presence of dirt inside the finned pack.

This dirt can have a variety of effects:

- Decrease of heat exchange efficiency
- Corrode the finned pack
- Create danger by overheating elements external to the finned pack itself
- Increase plant management cost
- Generate contaminated air

The interval of checks and relative cleaning of the finned packs are closely related to the type of dirt and therefore to the characteristics of the environment in which the product operates. Industrial or coastal-marine environments, for instance, need more frequent checks (we recommend a monthly supervision) to avoid the deposit, for example, of oily substances or the presence of chlorides.

Cleaning must be done in complete safety, when the product is not working.

Make sure to switch off the power supply.

Cleaning is more effective if it is done in the opposite direction of the air flow during normal operation.

The fins present a probable risk of cutting, therefore it is mandatory to use adequate PPE.

Cleaning must be performed in steps:

- Remove the dirt on the surface of the product by using industrial vacuum cleaners or by blowing plain air in the opposite direction of the air produced by the fan system.
- Remove the dirt among the fins of the finned pack by using compressed air or low pressured water (soapy water with neutral pH).

**For any of these operations, use the adequate PPE.**

Air direction must be perpendicular to the finned pack and pressure should not exceed 2 bar.

Position the blower at least 200 mm far from the fins.

If this cleaning procedure is not enough, it is possible to use detergents that are compatible with the types of materials that make up the product.

There are many commercial products available on the market with clear indications on how to apply them.

The packaging of these products also lists all the instructions that must be obligatory followed.

After the application of chemical detergents, it is important to thoroughly rinse making sure that the used water does not damage any part of the product.

If the finned pack to be cleaned is installed inside a cold room, make sure that the rinsing water does not damage goods therein contained.

Do not use harsh chemical cleaning agents, bleach or acidic detergents, and any other product not compatible with the materials mentioned above (e.g. water with the presence of salts, liquids containing chlorines, ammonia, etc.).

Do not use any tools that may damage the pipes or the fins (e.g. wire brushes, screwdrivers, etc.).

After cleaning, restore any distorted fins, if necessary.

During cleaning operations, it's also necessary to take into account the products used for surface coating; epoxy, acrylic, blygold, heresite powder coatings to name a few; in case of doubts, contact WingFan S.r.l.

This specification must also be applied to unpacked cooling systems after transport by sea, which may have residues (e.g. chlorides).

WingFan S.r.l. is not responsible for problems resulting from non-compliance with any instruction provided in this guide (e.g. improper use of detergents, failure to wear the correct PPE when using detergents, etc.).

## LUBRICATION

Spherical bearing supports must be lubricated.

It's necessary to provide with a correct quantity of good quality grease.

Lubricate with moderation, with small amounts of grease. Don't use oil but only grease.

Adopt grease according to the American Rule Class NLGI3 (National Lubrication Grease Institute) ranking the grease consistency required for this kind of applications in Class 3, for instance: MOBILUX3 of MOBIL or GADUS S2 V 100 3 IT No.3 of SHELL.

Greasing frequency depends mainly from the bearing operating conditions. In the table below are scheduled the time spans to be followed.

In case of environment exposing equipment to the dust and under temperature of 60° Celsius Degrees, the frequency must be from a minimum of 1 week to a maximum of 4 weeks. In such case start before with an average frequency of two weeks.

Check often during operation the lubricate effectiveness, especially in case of malfunctioning sign in the mechanical transmission (excessive heating, noise etc.).

Experienced operator is fundamental.

Then tune up the frequency depending on the effects but staying inside the limits pointed out in the table.

Environmental condition	Operating temperature	Frequency
Clean	- / 50°C	From 6 months to 12 months
	50°C / 70°C	From 2 months to 4 months
	70°C / 100°C	From 2 weeks to 6 weeks
	100°C / -	1 week
Dirty	- / 70°C	From 1 week to 4 weeks
	70°C / 100°C	From 1 week to 2 weeks
	100°C / -	From 1 day to 1 week
With a lot of humidity or splashing		1 week

## REFRIGERANT

The information given in this paragraph is generic and does not replace the information contained in the product and safety data sheets of the refrigerant in use.

Always refer to the information given in the safety data sheets of the refrigerant.

### ETHYLENE GLYCOL AS REFRIGERANT FLUID

Ethylene glycol is a colourless, odourless and moderately toxic viscous fluid.

It must not be ingested.

## TROUBLESHOOTING

Below are the main possible failures for a cooling system.

Failure	Cause	Solution
Leakage	<ul style="list-style-type: none"> <li>▪ Tubes can be ripped or erupted</li> </ul>	<ul style="list-style-type: none"> <li>▪ Contact the manufacturer</li> <li>▪ Add proper amount of glycol depending on outside ambient temperature</li> </ul>
Noisy operation	<ul style="list-style-type: none"> <li>▪ Installation of the product may not be appropriate</li> </ul>	<ul style="list-style-type: none"> <li>▪ Contact the manufacturer and the installation company</li> </ul>
The system stops frequently	<ul style="list-style-type: none"> <li>▪ Operating temperature and pressure can be higher than the design values</li> <li>▪ May be impeller or fan system failure</li> <li>▪ Fins may be clogged</li> </ul>	<ul style="list-style-type: none"> <li>▪ Contact the installation company</li> <li>▪ Check the impellers and replace the defective ones</li> <li>▪ Clean the fins</li> </ul>



In case of fan system provided, see also the table below.

Failure	Cause	Solution
All impellers are not running	<ul style="list-style-type: none"> <li>▪ Not enough voltage</li> <li>▪ Breakdown of the motor</li> <li>▪ No power supply</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check voltage values</li> <li>▪ Change motor</li> <li>▪ Check the power supply connection</li> </ul>
One or more impellers are not running	<ul style="list-style-type: none"> <li>▪ No power supply or the rotor of the fan system is blocked</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check the power supply connection</li> <li>▪ Make sure that the motor and any moving parts can rotate freely</li> <li>▪ Check the cleaning condition of the lamellar region</li> </ul>

Any type of service on electrical or mechanical devices has to be preliminary agreed with WingFan S.r.l.

Failure to do so will relieve the company from any responsibility for injuries to people and/or animals, damage to property or poorer performance than declared. In this case, the Warranty will no longer apply.

Any type of service on the product must be carried out solely by qualified personnel who are aware of the design conditions and have read this manual and the components manuals (if provided).

- The use of different components from those supplied by WingFan S.r.l. may generate malfunctioning and imply responsibility for injuries to people and/or animals, damage to property or poorer performances than declared, and the Guarantee Conditions will not be longer applicable.
- In case of appliance malfunction, and prior to any type of servicing, the power supply must be cut off.
- In the event of leakage or spills from the installed cooling system, detect the cause by using the adequate equipment and check the welding points on the headers and thermostatic valve, and the connections in general.
- In case of excessive noise, check that the fan systems are properly fastened and cabled. Also check for their balance and eliminate existing vibrations by replacing any defective impeller.
- If one or more than one fan systems fail to operate, check for correct electrical/hydraulic connection of the motor and for possible obstacles preventing blades rotation. Replace the impeller if it proves to be defective.

It is recommended to test the correct functioning of all the electrical and mechanical parts at least every six months by checking the operational temperatures.



## SPARE PARTS

When a component needs to be replaced, contact WingFan S.r.l. and refer to the identification label on the product.

## DISASSEMBLING INSTRUCTIONS

This paragraph identifies the main ways to proceed with the disassembly of the parts that make up the supplied product in order to replace some components and/or dispose them.

These operations must be carried out by qualified personnel who must always use adequate PPE.

The product must be disconnected from the mains and must not be operating.

In case of total disassembly, it is necessary to disconnect it from the plant/machine where it was installed and empty the circuit. It is necessary to consider that there are various models and construction types; each project should therefore be evaluated and analysed before proceeding with the disassembly of one or more parts.

First of all, it is necessary to delimit the intervention area, affix the safety signs and avoid the transit of personnel not involved in the operations.

Pay close attention during the disassembly operations to possible falls of the disassembled parts (often very heavy).

Provide the right supports for the disassembled components. Disassembling some components, the centre of gravity of the product could shift, causing it to overturn if not previously considered and avoided (by means of suitable fixings and constraints).

WingFan S.r.l. in no case is responsible for problems caused to people, animals or things during these operations.

### DISPOSAL

If the product is disposed of, it must be done by differentiating the various components.

Non-recoverable components must be handed over to the local community waste collection point for recycling.

For more information, contact the waste management service of the place where you intend to dispose of the components. Inappropriate waste management could have a negative effect on the environment and human health due to potential hazardous substances.

Below are the materials that usually make up the main components of the product:

- The cooler cores can be in aluminum or in copper and brass
- The carpentry can be in painted steel or in stainless steel
- The fittings can be in brass or steel, nickel or zinc plated
- Tubes can be silicone, EPDM or other
- The impellers are usually made of plastic (PA) blades with glass fibers but they can also be made of aluminum while the hubs that hold blades are usually made of aluminum

In case of doubts about the materials that make up the product, contact WingFan S.r.l. and use Directive 2014/955/EU as a reference.

## LEGAL NOTES

The use of unauthorized copies and/or translations of this guide and/or the use of translations without the original Italian version relieves WingFan S.r.l. from any possible consequence and responsibility in the event of an accident.

### CONTENT AND UNDERSTANDING OF THE GUIDE

If designers, installers and/or users (generally identified as operators) can't find the required technical information on the installation, use, maintenance and/or safe disposal of the product in this guide, or have doubt about installation, use, maintenance and/or disposal procedures, must contact WingFan S.r.l. This use and maintenance guide has been written to be as complete and clear as possible for its readers, depending on their preparation and competence. Failure to understand the contents of this guide, or incomplete understanding of the instructions contained therein, is a sufficient condition to immediately stop the design, installation, use, maintenance and/or disposal of the product.

In the event that the operators persist in their activity without having perfectly and completely understood this user and maintenance guide and/or without mastering all the know-how and information necessary to carry out their activity, WingFan S.r.l. will be relieved of all consequences and responsibility.

Designers, installers and users (maintenance operators) must promptly inform WingFan S.r.l. about situations that can reduce safety for people, property and the environment, and must act with the required competence, professionalism, spirit of collaboration and diligence.

Any act of negligence, reckless behaviour or any action that demonstrates poor technical-professional competence will relieve WingFan S.r.l. from any and all consequences and responsibility.

### RESPONSIBILITY

#### MANUFACTURER RESPONSIBILITY

WingFan S.r.l. is responsible for the design, construction, testing and packaging of the supplied product. The manufacturer guarantees that the product is designed, built, tested and packaged in compliance with the essential requirements set out in the applicable Community directives and that an appropriate conformity assessment has been carried out accordingly.

Although the manufacturer is not responsible for unpacking, installation, commissioning, maintenance, disassembly and disposal, these instructions contain as much useful information as possible about these operations during the life cycle of the product supplied.

All parts of the product have been designed, manufactured and tested in such a way as to withstand all reasonably foreseeable stresses in the foreseen conditions of use and in reasonably foreseeable conditions: no guarantee of safety and/or operation can be given if the coolers are used in conditions that are not explicitly contemplated by WingFan S.r.l., and are therefore prohibited.

The installation, use, maintenance and/or disposal of the product in prohibited conditions, not foreseen and/or in any case different from those foreseen by WingFan S.r.l. relieves the latter from any and all consequences and responsibility.

## DESIGNER AND INSTALLER RESPONSIBILITY

Installers and/or designers must assess the risks, prepare emergency, alarm, notification and protection equipment and systems and must also draw up complete instructions for the plant/machine on which the product is installed, as required by standard EN 378-4.

The designers and/or installers are also responsible for defining the best means and procedures for handling and storing the product outside the manufacturer's premises and/or warehouses. In particular, designers and/or installers must check the instructions provided by the manufacturer and have them observed during handling, transport and storage.

Wrong risk assessment, inadequate selection of emergency, alarm, notification and protection means and systems by designers and/or installers will relieve WingFan S.r.l. from any and all consequences and responsibility.

The designers are responsible for the design of the plant/machine in which the product is installed and are responsible for both the performance and safety aspects.

Designers have the responsibility to choose the most appropriate components for the plant/machine they are designing based on the limitations of use imposed by the manufacturer.

The designers must be sufficiently experienced and competent to clearly understand the content of this use and maintenance guide, as well as other technical-commercial document related to the product and are welcome to ask the manufacturer for any clarifications in order to implement the understanding of all the technical aspects and implement a plant/machine that is functional, safe and compliant with good manufacturing practices.

In particular, designers must be able to detect the reasonably foreseeable operating conditions of the product (conditions relating to the environment, fastening means, loads and stresses, connections to electrical systems, fluids, plumbing, etc.)

The incorrect identification of the operating conditions of the product by the designers relieves WingFan S.r.l. from any consequence and responsibility.

If the project is divided into several sections, whoever is responsible for the project will be considered the designer.

The installer is the person in charge of installing and constructing the plant/machine in accordance with the project specifications, component specifications, as defined by the respective manufacturers and good manufacturing practices.

The personnel involved in the various installation and commissioning operations of the product must be competent and trained. The minimum level to be guaranteed is indicated in EN 13313.

If the installation is divided into several steps, the installation coordinator, whoever he is, will be considered the installer.

## OPERATOR RESPONSIBILITY

The operator is the person who uses the plant/machine and, therefore, the product object of this use and maintenance guide. The operator is also responsible for the maintenance of the product.

The personnel involved in the various installation and commissioning operations of the product must be competent and trained. The minimum level to be guaranteed is indicated in EN 13313.

The operator of the plant/machine must work only with competent and trained personnel, equipped with the required personal protective equipment and qualified for the control, maintenance, repairs, emergency and disposal of the product.

Since WingFan S.r.l. is not involved in the design of the plant/machine, it is exonerated from any and all consequences and/or responsibility deriving from incorrect design/installation.

Since the products may undergo technical modifications and/or updates by the manufacturer, the plant/machine manager must check the compatibility between the plant/machine and the new version of the product.

## RELEVANCE OF EN 378 STANDARDS

The standard specifies the requirements for the safety of people and property, provides guidance for environmental protection and establishes procedures for the operation, maintenance and repair of refrigeration systems and the recovery of refrigerants.

The term "system refrigerant" used in this European Standard includes heat pumps.

The standard does not apply to "refrigeration systems for motor vehicles" covered by specific product standards, for example ISO 13043.

WingFan S.r.l. considers the application of the standards of the EN 378 group of primary importance for the safety of people, property and the environment, in relation to the use of the products covered by this guide.

Failure to comply with the requirements of these standards can mainly cause:

- The risk of refrigerant leaks or spillages, with the consequent risk of fire or explosion, and/or damage to people's health, damage to property and the environment
- The risk of injury for the people involved in the various phases such as installation, use, maintenance and disposal

## WARRANTY

Products of WingFan S.r.l. are guaranteed for 12 months.

The warranty effect date is given by the accompanying tax document, also shown on the identification label.

The warranty refers to free repair and/or replacement of the components with manufacturing defects.

WingFan S.r.l. binds the granting of the warranty to the verification of defects of all components.

According to Directive 2019/771/EC, the warranty given by WingFan S.r.l. can be applied only on its products, without considering any other components of the customer's plant/machine.

The label is part of the product. If it is missing (even partially), the warranty will not be valid anymore.

The warranty is limited to EXW repairs or replacements.

The warranty does not cover:

- Inspections, maintenance, repairs due to normal wear
- Wrong or non-compliant installation
- Non-use of safety devices
- Damages caused by improper use
- Power supply not indicated by the labels
- Transport and/or handling damages not claimed at receipt
- Vandalism and weathering damages
- Damages caused by storage non-compliant with the product's characteristics
- Damages caused by non-qualified and/or non-authorized staff



# WingFan S.r.l.

Legal office: Via Susa 15, 10138 Torino (TO), Italy

Headquarters: Via Torino 212, 10040 Leinì (TO), Italy

Tel. +39 011 998 07 77

[info@wingfan.it](mailto:info@wingfan.it)

[www.wingfan.it](http://www.wingfan.it)

