SANHUAMC®

MICRO CHANNEL HEAT EXCHANGER

INSTALLATION & MAINTENANCE MANUAL

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Foreword

This manual is a guide for installation and maintenance of Micro channel Heat Exchangers (MCHEs) supplied by Sanhua. We recommend that you read this manual carefully before starting any work.

MCHE is specially designed and manufactured for operating conditions that were specified by customer. Please consult Sanhua if you want to change the operating conditions.

Please note that Sanhua will not be responsible or liable for any damage caused by failure to comply with the instructions in this manual and/or due to incorrect installation, operation and maintenance of MCHE.

Catalogue

1. Storage and Working Environment

Micro channel heat exchanger should be stored indoor with a dry and clean environment. The chemical composition of the air surrounding the micro channel heat exchanger should be harmonious with aluminum. Avoid extreme PH environments as they might affect the aluminum oxide layer and, therefore, increase the risk of corrosion.

The storage temperature range is -30 ℃ to 121 ℃ (-22 ℉ to 250 ℉).

Metal chips, or dust of copper or steel can cause galvanic corrosion, so please keep the storage and installation areas clean and separate from machining or welding areas. Add use separate tools and/or keep tools clean.

To minimize potential damage, we recommend that you keep MCHEs in the package until ready to install them on your unit.

Improper storage and stack can cause premature corrosion or deformation and will reduce MCHE’s life. Extra care should be taken!

If without proper protection measures, MCHE shall not be exposed to the enviroments where sand or dust is heavy for storage or application.

2. Application Environment

Corrosion is a natural process, which converts a refined metal to a more stable form (like ore), such as its oxide, hydroxide, or sulfide. It is the gradual destruction of materials by chemical and/or electrochemical reaction with their environment. Corrosion of materials influences the service life of equipment and structure. Fortunately, when the environment factors are properly identified, the materials and protective options are appropriately selected, the progress of corrosion can be under control, the safety and reliability of the equipment and structure can be ensured during their service life.

MCHE coils are always used in atmosphere and their corrosion is mainly caused by atmosphere. Generally, the corrosivity of atmosphere are influenced by the climate and contaminations. The aggressive factors include but not limit to, temperature, relative humidity, wind, rain, snow, fog, dew, haze, dust, particles, proximity to pollutant source, sulfocompound, chlorine and chlorides, and nitrogen-containing compound. The combination of those and other factors may result in the premature failure of the equipment, so the environment corrosive factors shall be correctly identified before installation. It is noted that the localized environment surrounding the equipment and the probable changes in the future should also be considered.

Selection guide of MCHE materials and coating

The application environments of MCHE are often characterized as rural, urban, coastal (marine), industrial, combined coastal & industrial and so on. The atmospheric corrosivity of these environments is divided into six categories: C1, C2, C3, C4, C5 and CX, according to ISO 9223:2012 standard. The guidelines for MCHE coil materials and coating selection for different atmospheric corrosivity category are given in the following table 2-1.

Table 2-1 Options of MCHE coils

atmospheric Corrosivity category	C1, C2	C3	C4	C5	CX
corrosivity	Very low, Low	Medium	High	Very high	Extreme
MCHE STA*	☺	☺	☹	☹	☹
MCHE LLA**	☺	☺	😐	☹	☹
MCHE with TCP coating	☺	☺	☺	😐	☹
MCHE with E-coating	☺	☺	☺	☺	😐

*STA: Standard alloy; **LLA: Long life alloy;
: Recommended; : Acceptable when protection is applied; : Not recommended

It is also noted the selection criteria is a gross one. Depends on the local environmental characteristics, risk might still exist when recommended. Necessary protection measurements can extend the lifetime of MCHE, e.g. avoiding oceanic air blowing directly to the coil in the coastline area, or keep the coil far away from the coastline, seriously bad environment and industry area. Please refer to Sanhua engineering team for help if noticeable corrosion resource exists in the vicinity of the unit with MCHE for the recommended or acceptable option. Always choose the option for the most severe environmental factor.

Determination and estimation of atmospheric corrosivity

The applying environment shall be clearly identified for the intended installation. Generally, the atmospheric corrosivity of rural and urban environment are of C1-C3; The atmospheric corrosivity of coastal and industrial environment are of C3-C4; The atmospheric corrosivity of heavily polluted industrial areas and high salinity coastal areas can be of C5; Some extreme industrial areas, coastal and offshore areas, occasional contact with salt spary areas are of CX. But for the big environmental difference between different installation sites, and the probable changes in the future especially in areas with rapid growth, the corrosivity of the environment need to be estimated one by one. The reference methods for estimation the corrosivity of atmosphere are given here. Method A and B are rooted in ISO9223 standard, method C only relies on experience. These methods are all characterized by some uncertainties and limitations. And the reliability of the three methods decreases in the order A B C.

Determining the corrosivity categories for the atmospheric environments based on the first-year corrosion rate measured with standard metal specimens. The minim purity for Aluminum specimens required by ISO9226 is of 99.5%. The corrosion rate (r_{corr}) expressed in grams per square meter per year (g/(m^2·a)) of different categories for Aluminum are listed here: C1, r_{corr}, negligible; C2, $r_{corr} \leq 0.6$; C3, $0.6 < r_{corr} \leq 2$; C4, $2 < r_{corr} \leq 5$; C5, $5 < r_{corr} \leq 10$; CX, $r_{corr} > 10$.

Estimating the corrosivity categories for the atmospheric environments based on the calculated first-year corrosion rate. Dose-response functions for calculation describe four environmental parameters, SO_2 dry deposition, chloride dry deposition, temperature and relative humidity. Equation for Aluminum:

$$r_{corr} = 0.0042 \times P_d^{0.73} \times \exp(0.025 \times RH + f_{Al})$$
$$+ 0.0018 \times S_d^{0.60} \times \exp(0.020 \times RH + 0.094 \times T)$$
$$f_{Al} = 0.0009 \times (T - 10) \text{ 当 } T \leq 10℃\text{；}$$
$$\text{其它温度下，} \quad f_{Al} = -0.0043 \cdot (T - 10)$$
$$N = 113, R^2 = 0.65$$

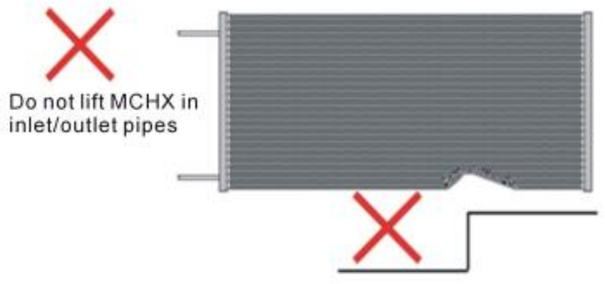
Where, r_{corr} is first-year corrosion rate of metal, expressed in micrometers per year (μm/a); T is the annual average temperature, expressed in degrees Celsius (℃), interval from -17.1 to 28.7; RH is the annual average relative humidity, expressed as percentage (%), interval from 34 to 93; P_d is the annual average SO_2 deposition, expressed in miligrams per square meter per day (mg/(m^2·d)), interval from 0.7 to 150.4; S_d is the annual average Cl^- deposition, expressed in miligrams per square meter per day (mg/(m^2·d)) , interval from 0.4 to 760.5.

Estimating the probable corrosivity of the atmospheric environments by referring to the corrosion performance of nearby equipment and/or infrastructure. For example, one can check the corrosion performance of the nearby heat exchanger coils in service for years, such as the nearby RTPF and/or MCHE coils. If the nearby coils are commonly coated, or severe corrosions such as crush, perforation, cracking have took place on bare aluminum fins, the corrosivity of the environment in the past service period should be at a high level. If the nearby coils are uncoated, and the bare aluminum fins are without obvious corrosion, the corrosivity of the environment in the past service period should be at a medium or low level.

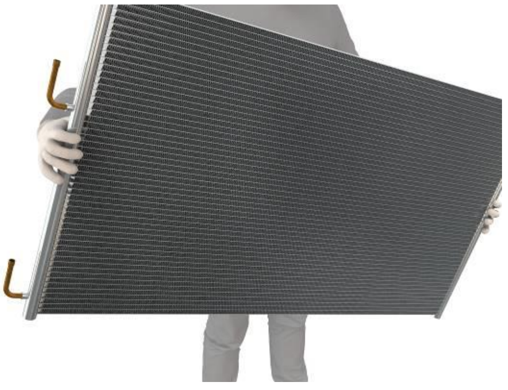
3. Handling - Handle with care!

Comparing with fin & tube coils, micro channel heat exchangers are relatively light. The fins are less easy to be bent and cut fingers. However the overall coil assembly is made of soft aluminum, so that it is surprisingly easy to be bent. The combination of these features makes it easy to handle and easy to be damaged. The good news is that there should be much less fin damage than traditional tube and fin coils because the micro channel tubes support and protect the fins. Keep in mind:

Keep in mind: The inlet and outlet tubes are designed only for connection and support their own weight. Unfortunately they locate where handles would be and often look like handles. **Never lift a MCHE by the inlet and outlet tubes!**



Do not hit or drop MCHE on edges.

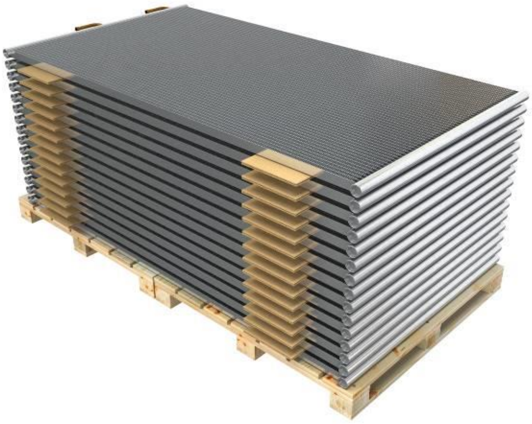


The right way to lift MCHE.

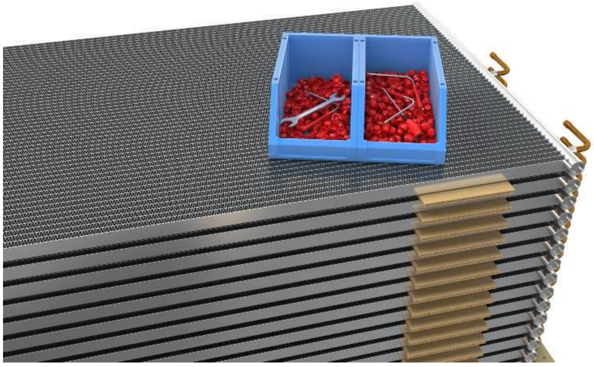
Because they are made of soft aluminum, dropping, impacting, forcing, placing heavy objects on top of, or stepping on MCHEs will almost certainly deform them. Any sharp objects contacting the product will cause leakage failure of the product. Don't put them on the ground, or put depending on the equipment, wall, or workbench. MCHEs must be put into the tray. And the products should not contact sharp objects.

Do not put MCHE on the ground.

Do not put MCHE depending on the equipment, wall, or workbench.

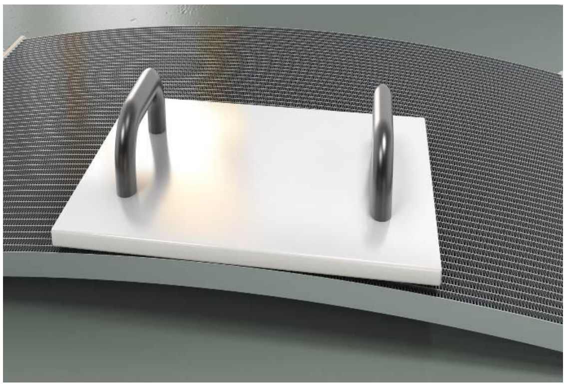


The right way to put MCHE.



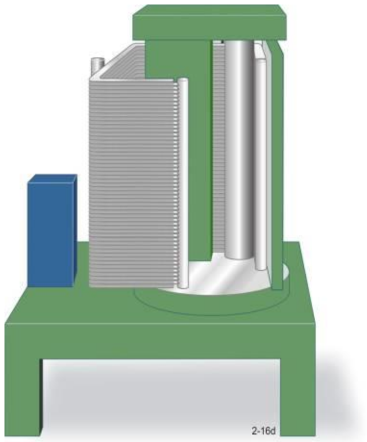
Never put anything on MCHE except scale board.

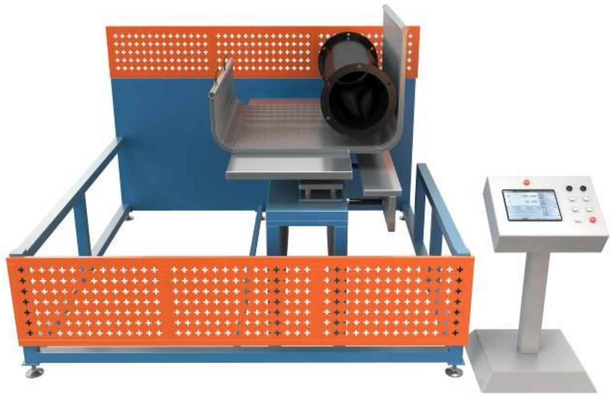
Notice that if the coils end up bowed, it is possible to flatten them back out by laying them concave side down on a flat table and tapping them firmly with a large heavy flat plate (say 3-4 square feet of ½" plywood or plastic sheet with a couple of handles attached).



This procedure works for bowed coils with flush fins, not for local fin protrusions.

4. Bending Procedure





The same bending machines can be used for MCHE and tube & fin heat exchangers. We recommend that ship flat MCHEs for efficient packing and bend them at customer's plant.

Warning：Relative intensify degree, bending radius and parameters need to be changed when using the same bending machines with tube & fin heat exchangers.

Bending radius

The minimal bending radius required to achieve acceptable manufacturing yields is a function of the micro channel tube, fin, and alloy, as well as the bending equipment, fixtures, bending speed and bending length. Therefore during the development process as a requirement customer should test bending the specific coil on the specific configuration to verify the design's manufacturability. In general, tighter radius, thicker tube and longer bend line are harder to bend. The below table is a rough guide to the possible smallest radius under the most favorable conditions. **Use a more generous radius as possible.**

Recommended minimal bending radii (as determined by factory tests under favorable conditions) are shown below for different micro channel tubes and fins. Consult with Sanhua for the tubes not listed. **Do not extrapolate or interpolate the values arbitrarily.**

Model	Structural parameters		Tube Alloy	Minimum Bending Radius	
	Tube (Wmm*Hmm*Port #)	Fin (Hmm*Gage mm)		mm	inch
2G12	12.0*1.0*12	8.1*0.07-FPI21	AA3102	40	1.57
4G12	12.0*1.5*14	8.1*0.07-FPI21	AA3102	50	1.97
4G12	12.0*1.5*14	8.1*0.07-FPI26	AA3102	60	2.36
1G16	16.0*1.8*10	8.1*0.10	AA3102	90	3.54
2G16	16.0*1.3*16	8.1*0.08	AA3102	90	3.54
3G16	16.0*1.3*16	11.4*0.09	AA3102	110	4.33
3G16	16.0*1.3*16	11.4*0.09	AA3103MOD	110	4.33
3G18	18.0*1.3*23	11.4*0.09	AA3103MOD	125	4.92
1G20	20.0*2.0*12	8.1*0.10	AA3102	110	4.33
2G20	20.6*1.3*20	8.1*0.08	AA3102	140	5.51
2G20	20.6*1.3*20	8.1*0.08	AA3103MOD	170	6.69

2G25	25.4*1.3*26	8.1*0.08	AA3102	200	7.87
2G25	25.4*1.3*26	8.1*0.10	AA3102	170	6.69
2G25	25.4*1.3*26	8.1*0.08	AA3103MOD	220	8.66
2G25	25.4*1.3*26	8.1*0.10	AA3103MOD	190	7.48
4G25	25.4*2.0*20	8.1*0.08	AA3102	200	7.87
4G32	32*2.0*25	8.1*0.08	AA3102	300	11.81
2G32	32*1.3*32	8.1*0.08	AA3102	300	11.81
4G32	32*2.0*25	8.1*0.1	AA3102	300	11.81
2G32	32*1.3*32	8.1*0.1	AA3102	300	11.81

Pay attention to the following matters during bending

Remember that micro channel coils are made of soft aluminum that is surprisingly easy to be bent during handling. Before you bend, make sure the MCHE is flat, square and undamaged. Consider a sizing operation to ensure this.

Keep them flat square and undamaged when the coils are loaded into the bender,

Keep the flat tubes perpendicular to the spindle when bending.

Clamp the coil during the bending, being careful, do not crush it.

Smaller bending speeds will make it better.

Vertical spindle bending machines are often set up so that the micro channel coil ends up sliding along the table with all its weight supported by to header ends and/or the dead tube on the bottom. The dead tube in particular is supported only by fins and really not designed to hold the whole weight of a large coil, particularly when combined with a frictional load that wants to push the fins over. Therefore be careful to insure that at no point during the bending operations is one end of the coil cantilevered off the edge of the table, because this can cause the coil to droop so that the tubes are no longer perpendicular to the spindle, resulting in corkscrewing or reduced bend quality and/or consistency. Note also that in some benders, portions of the table drop down during bending, creating more opportunities for cantilevers.

Per the above with vertical spindle benders, the quality, parallelism, and height (relative to the header ends) of the bottom dead tube can become important to control (depending on your coil holding fixtures).

Bending multi-bend coils on a horizontal spindle bender can also cause cantilevered loads from the dead weight of the unsupported bent legs. For instance on a three bend coil, depending on fixturing, the load of the first 75% of the coil may be put back into the remaining coil, possibly causing poor bend quality and/or permanent deformation. This problem is more severe with MCHE’s than with similar fin and tube coils.

Warning: E-coating and Powder coating products Can Not be bent.

5. Installation

The micro channel heat exchanger incorporation in a system shall be compatible with the product design pressures and temperatures. Design pressures and maximum allowable pressures of refrigerants are given as follows:

Refrigerant	Normal working pressure		Maximum working pressure	
R134a	1.32 MPa	191 Psia	2.0 MPa	290 Psia
R22	1.94 MPa	281 Psia	2.9 MPa	421 Psia
R407C	2.0 MPa	290 Psia	3.0 MPa	435 Psia
R404A	2.3 MPa	334 Psia	3.45 MPa	500 Psia
R410A	3.0 MPa	435 Psia	4.5 MPa	650 Psia

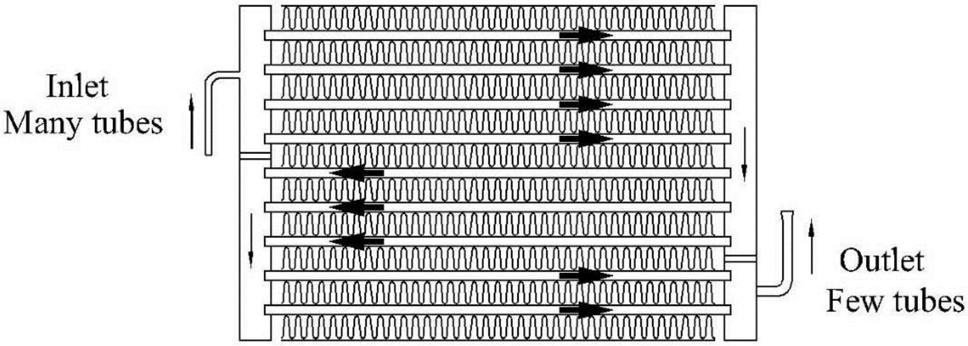
Range of temperature：

Ambient air temperature in the “run state” -30℃ to 72℃（-22 ℉ to 161.6 ℉）

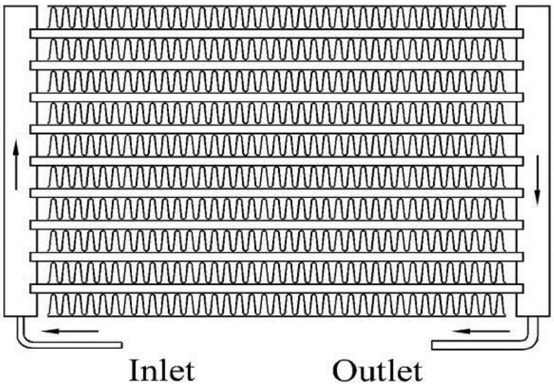
Range of the refrigerant side operating temperature -30℃ to 121℃（-22 ℉ to 250 ℉）

Pass Arrangement

Carefully identify the locations of the inlet & outlet tubes. Micro channel condenser is often designed with multiple passages (parallel flow) that have fewer tubes in each successive pass.



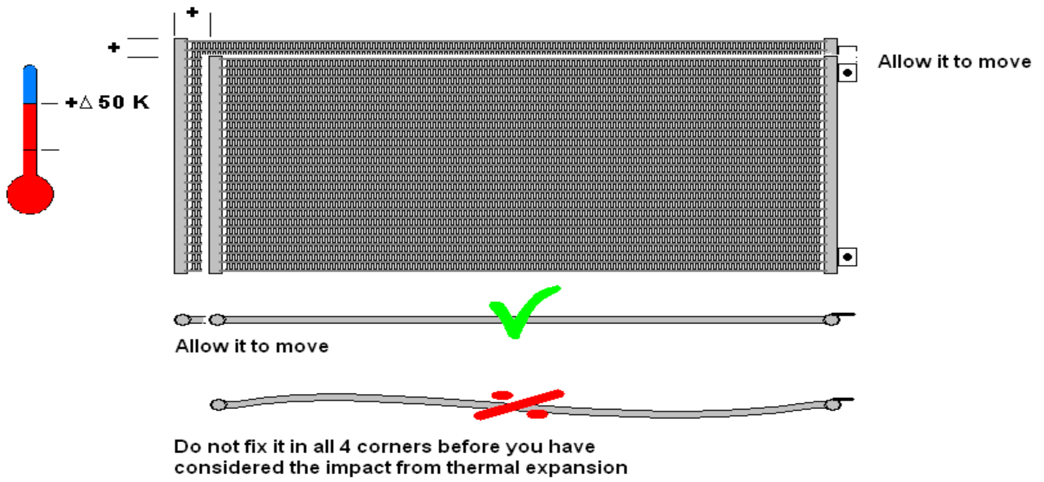
Micro channel evaporator is often designed with different inlet and outlet tubes diameter, the small tube is inlet tube, and the big one is outlet tube.



Confusedly connecting the inlet tube and the outlet tube of MCHE will result in excessively high refrigerant side pressure drop and poor heat exchanger performance.

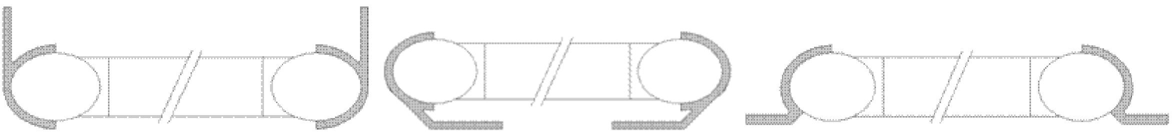
Coil Mounting

Thermal expansion of aluminum is higher than most other materials. To avoid continuous thermally induced stress that will shorten its life, the micro channel heat exchanger must be mounted with at least some flexible brackets, so movement is possible not to apply unnecessary stress/tension onto the heat exchanger or its connections.

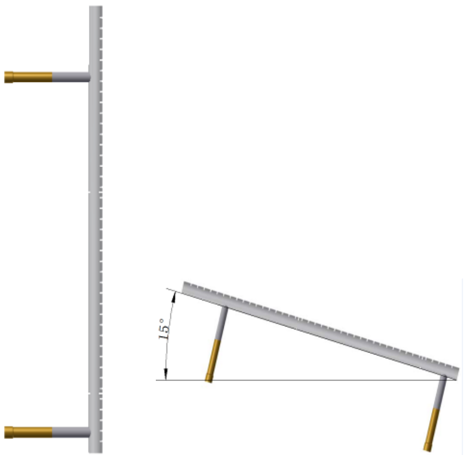


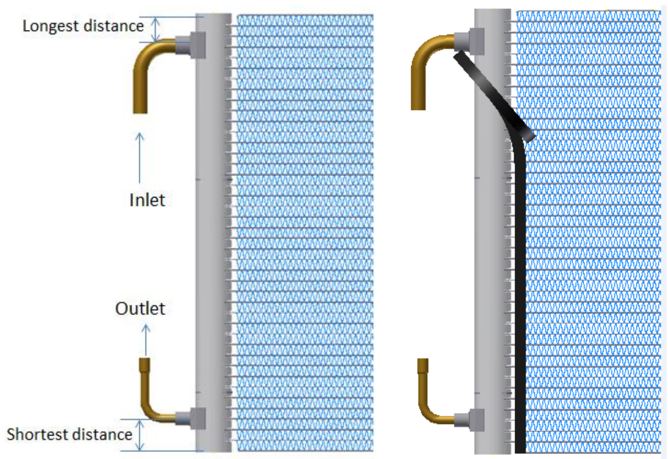
It is preferable for the mounting brackets of the MCHE to only touch rubber or plastic grommets, bumpers, etc. Direct contact with metal fasteners and/or frames can result in galvanic corrosion unless appropriate measures are taken to prevent it thru careful alloy selection, paints/coatings, etc.

In order to fulfill customer-specific requirements, a variety of different mounting brackets are available, as below:



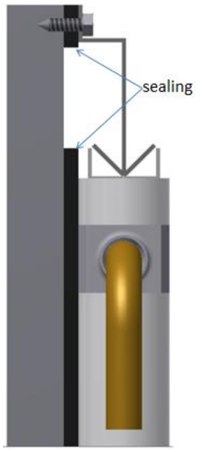
For more brackets, please contact with Sanhua engineers to get more information.





The MCHE condenser is designed to have the airflow and refrigerant in cross flow configuration. Arrange the two flows correctly. The condenser performs best installed vertically or at least 15 ° from the horizontal with the refrigerant inlet at the upper connector, and the outlet at the lower connector. Ensure that the air flow is distributed evenly across the entire face area in accordance with the technical specification to attain the specified capacity. This can be achieved by housing the air flow and making sure there are no short-cuts between the fan intake and outlet. Seal the wide gaps on both sides of the face area with sealing.

When brazing the lines to the copper connections, fill in with nitrogen in the refrigeration system including the coil, then use a wet rag at the base of the copper connection to minimize heating of the copper / aluminum transition. Installation supports/brackets must also allow the MCHE to move in two dimensions. Remember to insert plastic/rubber/foam between the aluminum coil and dissimilar metals.



Warning: Make sure there is no oxide-scale in the refrigeration system.

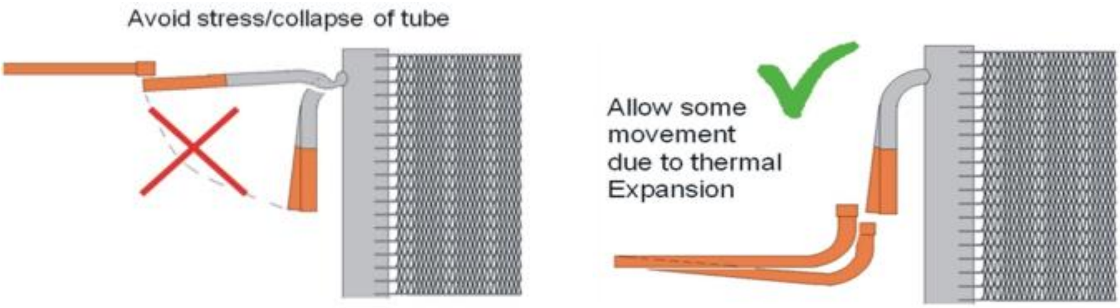
Inlet/outlet connections

Inlet/outlet connections are designed to support themselves and for connections, *not* to act as handles, support mating tubes, resist thermal expansion, or be forced into position with mating tubes during assembly, etc.. In particular:

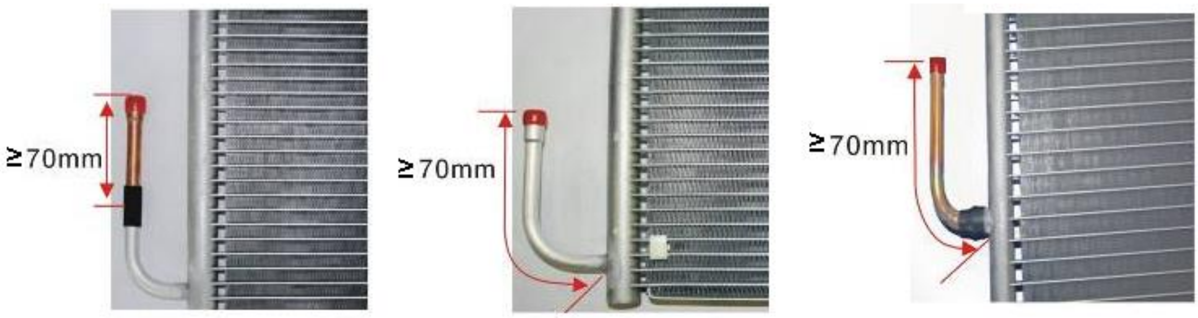
Inlet/outlet connections should also be assembled & supported so the brazed joints are not exposed to stress/tension.

For tubes of the units connecting to the inlet and outlet connections of MCHEs, there should be applying the design of proper cushioning measures to prevent the inlet & outlet connections from shatter crack in the long running term.

To avoid damaging or collapsing the thin walled aluminum inlet/outlet tubes, mating tubes should be pre-bent/prepared so no bending/forcing is needed during installation.



When copper and aluminum tubes are joined together, galvanic corrosion of the aluminum can result. Prevent this by protecting the joint with paint or a plastic heat shrink tube. (This will prevent moisture from entering the area and enabling corrosion by completing the galvanic circuit.)



The pipe length after the brazing joint should be longer than 70mm.

To protect the Cu-Al brazing joint and shrink tube from the heat of later brazing, the tube length after the joint on inlet/outlet pipes should be longer than 70mm. When brazing the coil into your system, for the Cu/Al brazing joints and the plastic heat shrink tubes, additional protection can be obtained by dry nitrogen purging and/or wrapping the copper stub tube with a wet cloth, it is not allowed that the heat shrink tube to be over burned. The aluminum inlet/outlet tube on the MCHE also needs to be at least 70mm long to protect the tube-header braze joint.

Adequately clean the copper tubes before brazing the core connections so that there are no copper bits(residuals from the previous manufacturing processes) that may enter into the aluminum heat-exchanger during working.

Do not modify the core if not authorized by Sanhua, Ltd

Warning: When removing the rubber stopper of the products with Nitrogen inside keeping pressure, we suggest using the special puller in case of injuring the fingers.

Sanhua suggest to set protective screening outside of the MCHE in case that the object, such as tree branch, bigger sand, blew by the wind may destroy the coil and lead to leakage, on the other hand, it could prevent the sand, dust ,waste blocking the MCHE fins which will impact the heat transfer performance.

There’re many ways to install products. If you want to know more things, please contact with the technology engineers of Sanhua micro channel heat exchanger.

6. Refrigerant charge

SanHua MCHE requires a significantly smaller refrigerant charge than T&F heat exchanger. Over-charging or less charging will be loss of system capacity.

Charge as follows:

Remove the residual gas and moisture in system by pulling a vacuum on it to meet the below requirement.

For single component refrigerant R-134a and azeotropic mizture refrigerant R404A, R407C and R410A, the moisture content must not exceed 30 PPM; for R22, it must not exceed 25 PPM.

Under full-or near full-load operating conditions, put approximately 1/3rd the nominal charge (by mass of refrigerant) in the system. Allow the system to stabilize, and check for gas bubbles in the liquid line sight glass.

Add small amounts (10g) of refrigerant one time, allowing the system to stabilize each time and checking for bubbles as before. Once there are few or no gas bubbles entering the expansion valve, the charge is most likely correct.

If the system is operating with higher pressure than that specified, remove refrigerant from the system gradually until there are few gas bubbles in the liquid line sight glass, then repeat Step2.

Warning: 1. Refrigerants used to charge the micro channel heat exchanger should be from normal manufacturers and must meet international laws and regulations and standards. Also don't mix different brand refrigerants to charge heat exchanger.

2. Sanhua Mirco cores are designed for evaporators and condensers of refrigerants group I and II. The used refrigerant type shall be in accordance with the refrigerant type if it is indicated on the product label; or the used refrigerant type shall be in accordance with the technical requirement of the approved drawing. Do not use the other kinds of refrigerant if not after Sanhua's approval

7. Leak Repair Procedure

The procedure that repairing Micro channel tube leakage by torch brazing is just used for tube nose repair.

Obtain the following materials and tools：

Material Included: Non-corrosive flux, Pre-fluxed Zinc-Aluminum Repair Wire, Stainless Steel Heat Shields or High Temperature Resistant Cotton, Nitrogen or compressed dry air

Tools Included: Needle nose pliers (long nose)/Brush/Knife/Oxy-Acetylene torch

The below instructions assume that you are familiar with general air conditioning repair procedures and have the appropriate equipment to evacuate the unit before the repair, then charge and performance test the unit afterward.

Leakage point detection

Leak check per the A/C unit instructions or as follows. Use nitrogen or compressed dry air to pressurize the heat exchanger, and then detect the leak point by spraying the coil with a soap solution and looking for bubbles and/or foam. Alternatively, pressurize the MCHE with refrigerant or helium then detect the leak point by passing the appropriate sensor over the coil and mark the point.

Clean the leak point

Remove the dirt from the surface around the leak point with brush and water.

Eliminate the oil around the leak point by alcohol.

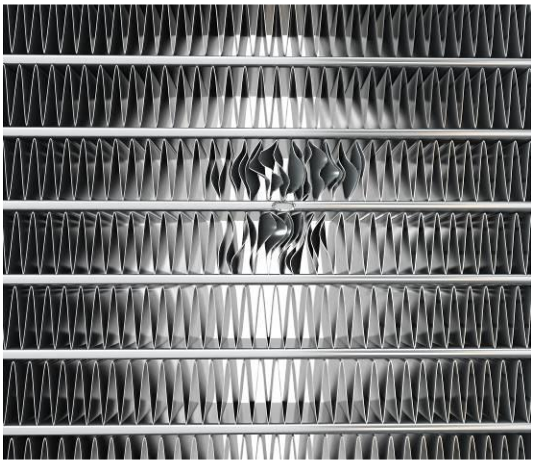
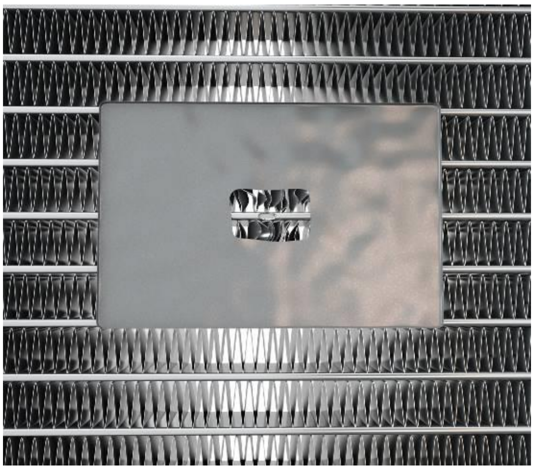
Open up the leak point by knife

Open up the leak point to at least ø1mm by using the tip of knife carefully. Remove all aluminum fragments;

Shape the cut to make it easy for epoxy resin to enter the micro channel like the below right picture shows.

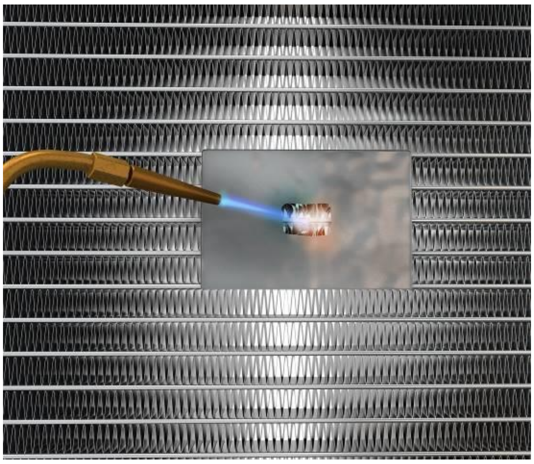
Clean the surface around the leak point with alcohol.

Place metal mask material (heat shield) around the damaged area to protect adjacent tubes and air centers.

Adjust the torch tip to a neutral or rich carburizing (low oxygen) flame (450o-500oC), and apply heat to the edge of the damaged area. Place the end of the solder wire against the damage and gradually heat the edge of the tube and mask area parallel to the damage until the solder wicks into to the core tube ports. Allow to cool and remove the masks.

Warning: The core tube walls are very thin, and it is possible to burn through the tube wall if excessive heat is applied. Avoid contact with eyes, skin; do not inhale.




Repeat original leakage check the heat exchanger with nitrogen or compressed dry air to verify that the leak has been plugged.

8. Cleaning Procedure

Dirty coil decreases the capacity of the system, its energy efficiency and may potentially cause system failures. It's necessary to put a sufficient protection grid and air filter when appropriate. In addition to this, the system and the coil should be periodically inspected and cleaned in accordance with the cleaning procedures.

Relative to fin and tube heat exchangers, micro channel coils tend to accumulate more of the dirt on the surface and of the less dirt inside which can make them easier to clean. The cleaning procedures are as follows:

Remove surface debris

Remove surface dirt, leaves, fibers, etc. with a vacuum cleaner (preferably with a brush or other soft attachment rather than a metal tube) or a brush, compressed air blown from the inside out, and/or a soft bristle (not wire!) brush. Do not impact or scrape the coil with the vacuum tube, air nozzle, etc.

Rinse

Do not use any chemicals (including those advertised as coil cleaners) to wash micro channel heat exchangers. They can cause corrosion. **Rinse only.**

Hose the MCHE off gently, preferably from the inside out and top to bottom, running the water thru every fin passage until it comes out clean. Micro channels fins are stronger than traditional tube & fin coil fins but still need to be handled with care. Do not bang the hose into the coil. We recommend putting your thumb over the end of the hose rather than using a nozzle end because the resulting spray is gentler and the possibility for impact damage is less.

Optional blow dry

Micro channel heat exchangers, because of their fin geometry, tend to retain water more than traditional fin & tube coils. Depending on the specific design and installation of your coil, it may be beneficial to blow or vacuum out the rinse water from your unit to speed drying and prevent pooling.

Warning!

It is possible to carefully clean a coil with a pressure washer, **but it is also possible to totally destroy a**

coil with a large pressure washer so we do not recommend their use. The washer water rated pressure of nameplate must be less than 50Bar, the ejection pressure of nozzle is less than 2Bar; the distance between nozzle and coil must be more than 1000mm, and keep nozzle centerline and coil surface as vertical angle as much as possible.

Warranty claims related to cleaning damage, especially from pressure washers or chemical attack, will not be honored.

9. E-coating Cleaning Procedure

The following cleaning procedures are recommended as part of the routine maintenance activities for Sanhua E-Coated Coils. **Documented routine cleaning of Sanhua E-coated coils is required to maintain warranty coverage under the Sanhua E-coating supplier's terms and conditions of sale. Contact Sanhua service for more information of the E-coating supplying terms and conditions.**

Remove Surface Loaded Fibers

Surface loaded fibers or dirt should be removed prior to water rinse to prevent further restriction of airflow. Soft non-metallic bristle brush or other cleaning tools may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges bent over) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Periodic Clean Water Rinse

A **monthly** clean water rinse is recommended for coils that are applied in coastal or industrial environments to help to remove chlorides, dirt and debris. It is very important when rinsing, to water temperature is less than 55^0 C and pressure is than 50 bar to avoid damaging the fin edges. An elevated water temperature (not to exceed 55^0 C) will reduce surface tension, increasing the ability to remove chlorides and dirt.

Routine Quarterly Cleaning of Sanhua E-Coated Coil Surfaces

Quarterly cleaning is essential to extend the life of an E-coated coil and is required to maintain warranty coverage. Coil cleaning shall be part of the unit's regularly scheduled maintenance procedures. Failure to clean an E-coated coil will void the warranty and may result in reduced efficiency and durability in the environment.

For routine quarterly cleaning, first clean the coil with the below approved coil cleaner (see approved products list under Recommended Coil Cleaners section). After cleaning the coils with the approved cleaning agent, use the approved chloride remover (under the Recommended Chloride Remover section) to remove soluble salts and revitalize the unit.

Recommended Coil Cleaner

The following cleaning agent, assuming it is used in accordance with the manufacturer's directions on the container for proper mixing and cleaning, has been approved for use on e-coat coils to remove mold, mildew, dust, soot, greasy residue, lint and other particulate:

Product	Reseller	Part Number
Enviro-Coil Concentrate	HYDRO-BALANCE CORPORATION	H-EC01
Enviro-Coil Concentrate	Home Depot Supply	H-EC01

Recommended Chloride Remover

CHLOR*RID International, Inc
PO Box 908
Chandler, Arizona 85244
Bus:(800) 422-3217
Bus Fax: (480) 821-0364

CHLOR*RID DTS™ should be used to remove soluble salts from the e-coated coil, but the directions must be followed closely. This product is not intended for use as a degreaser. Any grease or oil film should first be removed with the approved cleaning agent. Contact Sanhua for more information on it.

Remove Barrier - Soluble salts adhere themselves to the substrate. For the effective use of this product, the product must be able to come in contact with the salts. These salts may be beneath any soils, grease or dirt; therefore, these barriers must be removed prior to application of this product. As in all surface preparation, the best work yields the best results.

Apply chloride remover - Apply chloride remover directly onto the substrate. Sufficient product must be applied uniformly across the substrate to thoroughly wet out surface, with no areas missed. This may be accomplished by use of a pump-up sprayer or conventional spray gun. The method does not matter, as long as the entire area to be cleaned is wetted. After the substrate has been thoroughly wetted, the salts will be soluble and is now only necessary to rinse them off.

Rinse - It is highly recommended that a hose be used, as a pressure washer will damage the fins. The water to be used for the rinse is recommended to be of potable quality, though a lesser quality of water may be used if a small amount of chloride remover is added.

CAUTION: Harsh Chemical and Acid Cleaners

Harsh chemicals, household bleach or acid cleaners should not be used to clean outdoor or indoor E-coated coils. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion and attack the E-coating. If there is dirt below the surface of the coil, use the recommended coil cleaners as described above.

CAUTION：High Velocity Water or Compressed Air

High velocity water from a pressure washer or compressed air should only be used at a very low pressure to prevent fin and/or coil damages. The force of the water or air jet may bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdowns may occur.

10. Safety and environmental protection

Please refer to the instruction book before installing the production. Handle the production gently to avoid damaging the production when installing.

When installing the products to the units or during the maintenance work, workers shall have the related professional qualifications, and shall take proper labor protection measures to ensure their safety during the work.

It’s using high temperature flame brazing when repairing the production. Don’t touch the repaired area and protect yourself from getting a burn by the high temperature.

The core is composed of different aluminum alloys, when deposing of the cores, please recycle the materials, don’t discard carelessly; meanwhile keep in mind that after use there will be internal circuit residuals of oils used in the refrigerant circuit, it should be also recycled in order to meet the environment protection requirement.

In order to reduce the greenhouse effect and maintain the earth's ozone layer, it is recommended that customers use environmentally friendly refrigerants

11. Water application.

The circuit must be closed, The circuit must be filled and all the air inside must be removed.

The fluid must be water glycol +inhibitor (min 35% according to the experience)

The max fluid velocity must be less than 1.4m/s

During the start-up, use a filter with mesh 100, while during working conditions 80 is enough.

The PH of water +glycol+inhibitor must be managed from 7 to 8.2

The maintenance actions must be defined to prevent the inlet of additional oxygen.

If the core is tested by using only water, the circuit must be filled immediately with a solution water +glycol+inhibitor.

Don’t use Fe Zn parts for internal circuit.

Check annually the % of glycol +inhibitor. If necessary, fill up to obtain the designed value

The maximum design pressure PS=0.18Mpa, and the burst pressure PT=0.65Mpa

The MCHE for water application, we suggest to use victaulic connection.

In case of corrosion environment, we suggest to use our e-coated cores.