

General Service Bulletin

Microchannel Coil Servicing Guidelines Trane Unitary Light and Large Commercial Units

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully.

⚠️ WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠️ CAUTION: Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE: Indicates a situation that could result in equipment or property-damage only accidents.

⚠️ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

⚠️ WARNING

Personal Protective Equipment (PPE) Required!

- Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards. Before installing/servicing this unit, technicians **MUST** put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. **ALWAYS** refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.
- If there is a risk of arc or flash, technicians **MUST** put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, **PRIOR** to servicing the unit.
Failure to follow recommendations could result in death or serious injury.

Introduction

The purpose of this bulletin is to inform service technicians of microchannel condenser coil technology as it applies to Trane Unitary Commercial HVAC systems. This bulletin will discuss the construction, handling, coil coating, cleaning, repairing and replacement of microchannel coils.

Discussion

Microchannel coils are an all aluminum coil that have been successfully used in the automotive industry for many years, and is now being applied in the HVAC industry. Microchannel technology is an entirely new condenser coil design for air cooled (direct expansion) equipment. The all aluminum construction of microchannel coils consist of tubes, headers and ribbon fins that are all brazed together in a controlled air automated brazing furnace. This automated brazing process dramatically reduces the number of brazed joints that are typically seen with the traditional tube and fin condenser coils. Their compact all aluminum construction also helps to reduce the unit's weight improves recyclability and minimizes galvanic corrosion.

Key advantages of Microchannel coils:

- Smaller coil, less refrigerant, same cooling capacity.
- Serpentine louvered fins transfer heat more efficiently.
- Small tube/channel size reduces refrigerant volume.
- Potential charge reductions from 30%-50% depending on unit configuration.
- Ability to claim LEED credit for reduced refrigerant per ton.
- Brazed fin/tube/header creates a more rigid structure compared to tube and fin condenser coils.
- Extremely durable during shipping and handling.
- Because construction consist of rigid tubes, there are no thin fin material to comb out.
- No new requirements for use within R-410A equipment to charge, recover, recycle or pull a vacuum on refrigerant system.
- Compact all-aluminum microchannel coils help to reduce the unit weight.
- All-aluminum construction improves recyclability and minimizes galvanic corrosion.
- Strong aluminum brazed structure provides better fin protection.
- Flat streamlined tubes make microchannel coils more dust resistant and easier to clean.

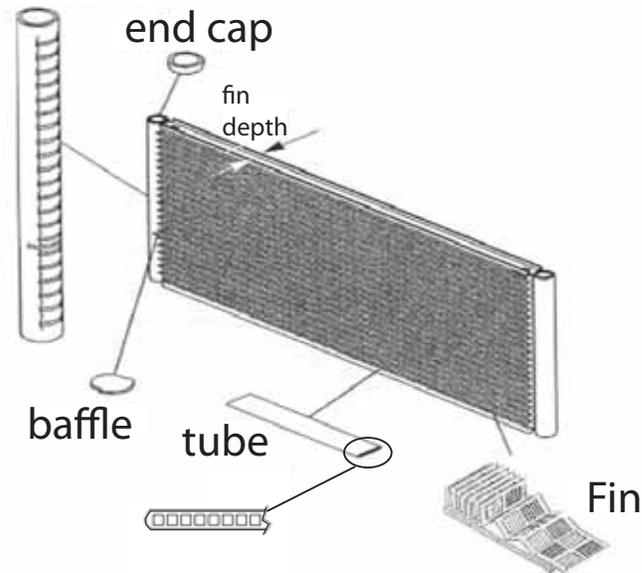
Microchannel Construction

The fully-brazed construction of a microchannel coil increases the coil rigidity making them more rugged to withstand the rigors of job site handling and damage due to shipping. The microchannel coil's headers, tubes and fins are assembled and then sprayed with a powder flux bonding agent. The coil is then sent through a large controlled air automated brazing furnace that completely joins these separate pieces as one solid microchannel coil. This process alone substantially decreases the chances of leaks due to improper brazing techniques.

Refrigerant flows thorough the header assembly into multiple flat refrigerant filled tubes. Within each tube are ports that serve as paths for the refrigerant to flow through the microchannel coil. The bottom and top tubes of each coil section are always inactive refrigerant paths. This is done to prevent refrigerant leaks due to corrosion that may be present from moisture resting between the top or bottom tube and the gasket material and also serve as a buffer during the installation and removal of the coil section. Each fin surface is angled and louvered to create air turbulence through the coil which provides more efficient and enhanced heat transfer without additional air pressure drop through the coil.

Figure 1. Microchannel coil construction

header



For optimal performance and to ensure that the refrigerant arrives at the metering device in liquid form microchannel coils must also subcool the refrigerant just as a typical tube and fin condenser coil would. Units with single section microchannel coils utilize a baffle internally brazed inside the header assembly. The purpose of this baffle is to redirect refrigerant flow separating the condensing section of the coil from the subcooling portion (Figure 2). Other units will accomplish this task by using two separate coils and connecting the condensing and subcooling sections through the use of a manifold header assembly (Figure 3).

Figure 2. Microchannel coil with baffle

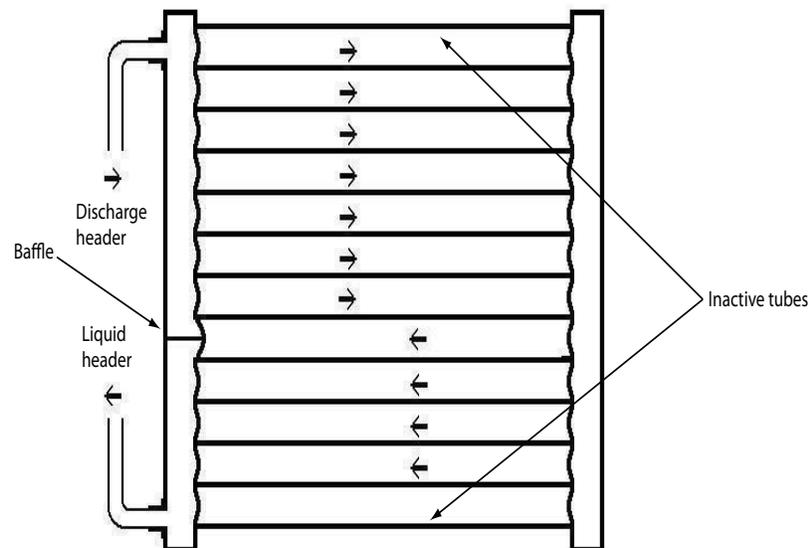
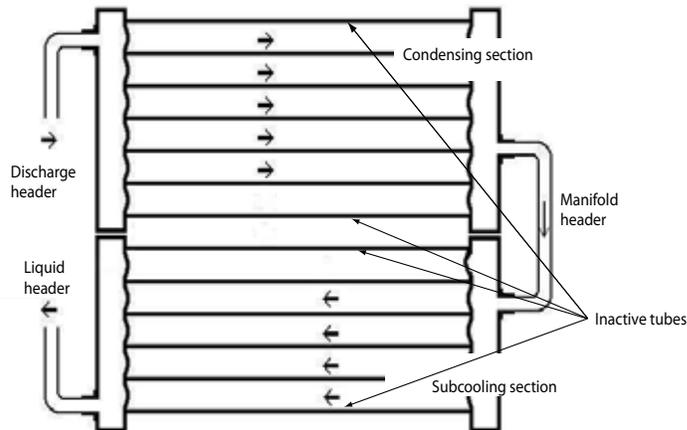


Figure 3. Double Microchannel coil with manifold



In order to join the coil with the rest of the unit's copper tubing, the coils have a manufactured flame brazed copper to aluminum connection. Because the joint consists of two dissimilar metals, if not sealed correctly galvanic corrosion can severely weaken the joint. For this reason, the copper to aluminum joint is fabricated at the manufacturing facility in an extremely controlled process and should not be made or repaired in the field. Any leaks seen at this joint warrant a replacement coil. A special protective heat shrink sleeve lined with adhesive helps protect the integrity of this joint from environmental corrosive agents (Figure 4). Should coil replacement ever be necessary, please be sure that when brazing the temperature at the copper to aluminum joint DOES NOT EXCEED 465°F (240.5°C).

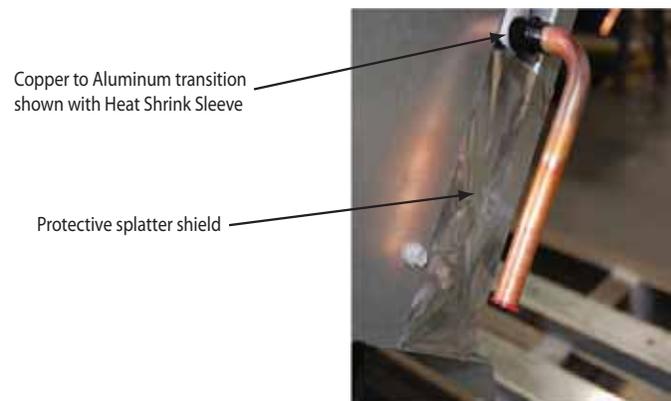
NOTICE:
Coil Damage!

When brazing in the new Microchannel coil, the temperature at the copper - aluminum joint MUST NOT exceed 465°F. Failure to follow this requirement could result in coil damage.

Protection of this joint is required when brazing the copper to copper connections. This can be accomplished by placing a wet rag or heat paste over the heat shrink sleeve during the brazing process.

Some units ship from the factory with a protective aluminum splatter shield (Figure 4). This is not a heat shield. Instead this shield is used to protect the coil from copper brazing filler metal splatter. If coil replacement becomes necessary, application of the supplied aluminum splatter shield to the header is required when brazing the replacement coil's copper to copper connections. This prevents the possibility of galvanic corrosion created by braze splatter interacting with the aluminum coil.

Figure 4. Splatter shield



Due to the extent of the thermal expansion rate of aluminum, microchannel coils should not be rigidly mounted to the unit. The unit structure or framing serves as an apparatus to support the coil's position but still allows the coil to float or expand freely due to the thermal changes.

Pumping down refrigerant into the microchannel condenser coil on a unit with a standard tube and fin evaporator coil is not permissible. The reduced capacity of a microchannel coil compared to that of a tube and fin coil makes it impossible to store any considerable amount of refrigerant charge in the microchannel condenser coil. It still is possible with the addition of suction and discharge line service valves to replace the compressor without removing the total system charge and just evacuating the small amount of refrigerant left between the two valves.

Coil Coatings

In applications where the microchannel coil may be susceptible to corrosive elements a "factory" coated coil option is available. The "factory" coating option is a dipped and baked cathodic epoxy coating with a UV-A resistant topcoat. The coil coating is applied directly from the manufacturer and qualified to meet Trane's requirements for coating coverage, quality, corrosion resistance, UV-A resistance, heat transfer, air pressure drop performance, and still meet the unit's published AHRI catalog ratings. The coating shall meet or exceed ASTM B117 Salt Spray Test and ASTM G85 A2 Cyclic Acidified Salt Fog Test requirements.

Trane does not recommend the use of any field applied corrosion resistant coatings. Field applied corrosion coatings can not provide the same coating adhesion as the "factory" coating option that completely encapsulates the coil with a dipped & baked on corrosion resistant coating. If a field coating is applied, Trane cannot guarantee that the unit will meet cataloged performance ratings or the coils resistance to corrosion.

Handling of Microchannel Coils

Although microchannel coils are extremely robust compared to fin and tube coils, care must still be taken to ensure that leaks are not caused by improper handling. Because refrigerant flows through the coil tubes so close to the edge, extra care with these coils around sharp objects or sudden impact must be taken. Although some leaks in the microchannel coil can be repaired, this repair is only temporary until a new coil can be ordered and installed.

The lightweight construction of microchannel means that two men should generally be able to handle the coil without any problems; however there are lifting lugs located on microchannel coils for assisted removal and installation and should avoid the use of straps being wrapped around the coils fin surface.

NOTICE: **Coil Failure!**

Do NOT handle a Microchannel coil by its copper to aluminum header assembly. This could lead to premature failure at the manufactured joint and coil replacement.

Although it may seem convenient, please refrain from handling the coil by its copper to aluminum header assembly ([Figure 4](#)).

Recommended Cleaning Procedures

Regular coil maintenance, including annual cleaning-enhances the unit's operating efficiency by minimizing compressor head pressure and amperage draw. The condenser coil should be cleaned at least once each year or more if the unit is located in a "dirty" or corrosive environment. Cleaning with cleansers or detergents is strongly discouraged due to the all aluminum construction; straight water should prove sufficient. Microchannel coils can be more susceptible to corrosion if the cleanser or detergent used is not thoroughly washed or rinsed off. Any breach in the tubes can result in refrigerant leaks.

⚠️ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Disconnect Power to the unit.

⚠️ CAUTION

Personal Protective Equipment (PPE) Required!

ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. If it becomes necessary to use cleaning agent, refer to the manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in minor to moderate injury.

2. Wear proper personal protection equipment such as a face shield, gloves and waterproof clothing.
3. Remove enough panels from the unit to gain safe access to the microchannel coil.

Note: It is better to clean the coil from the opposite direction of normal air flow (inside of unit out) because this allows the debris to be pushed out rather than forced further into the coil.

⚠️ WARNING

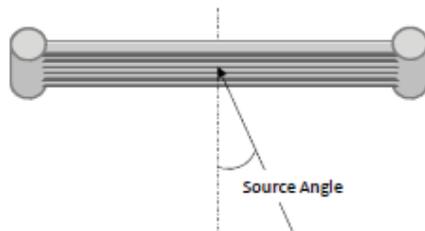
No Step Surface!

Do not walk on the sheet metal drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall. Failure to follow this recommendation could result in death or serious injury.

Important: Bridging between the main supports required before attempting to enter the unit. Bridging may consist of multiple 2 by 12 boards or sheet metal grating.

4. Use a soft brush or vacuum to remove base debris or surface loaded fibers from both sides of the coil.
5. Using a sprayer and water ONLY, clean the coil following the guidelines below.
 - a. Sprayer nozzle pressure should not exceed 600 psi.
 - b. The maximum source angle should not exceed 25 degrees (Figure 5) to the face of the coil. For best results spray the microchannel perpendicular to face of the coil.
 - c. Spray nozzle should be approximately 1"-3" from the coil surface.
 - d. Use at least a 15° fan type of spray nozzle.

Figure 5. Source angle



Important: Only in extreme cases should any type of chemical cleaner or detergent be used on microchannel coils. If it becomes absolutely necessary because water alone did not clean the coil, one coil cleaner available through your local parts center is Nu-Calgon Evap Pow'R (Trane P/N CHM00351). If this can not be obtained specify a cleaner that is:

- A is pH neutral cleaner.
- An alkaline cleaner that is no higher than 8 on the pH scale.
- An acidic cleaner that is no lower than 6 on the pH scale.
- Does not contain any hydrofluoric acids.

Be sure to follow the instructions provided with any cleaner chosen. Keep in mind that it is still MANDATORY that the coils are thoroughly rinsed with water after the application of the cleaner even if the instructions specify a "No Rinse" cleaner. Cleaners or detergents that are left on the coil due to improper rinsing will significantly increase the possibility of corrosion damage on the microchannel coil.

6. In order to meet their required efficiencies, some units will have a double coil configuration (Figure 6). For maximum effectiveness it will be necessary to clean between the two coils. Because of their close spacing (~1"), it will be necessary to add a 90° sprayer attachment to properly clean the coil.

NOTICE:
Coil Damage!

To avoid damage from the spray wand contacting the coil, make sure the 90° attachment does not come in contact with the tube and fin as abrasion to the coil could result. Care must be taken when inserting the wand extension between the coil slabs.

Recommended attachments available through your local Trane Parts Center are listed below.

- | | | |
|----------|-------------|---|
| TOL03661 | 9972-36-KIT | 90° Nozzle attachment w/ quick disconnect 36" extension |
| TOL03662 | 9972-48-KIT | 90° Nozzle attachment w/ quick disconnect 48" extension |

Figure 6. Double coil configuration

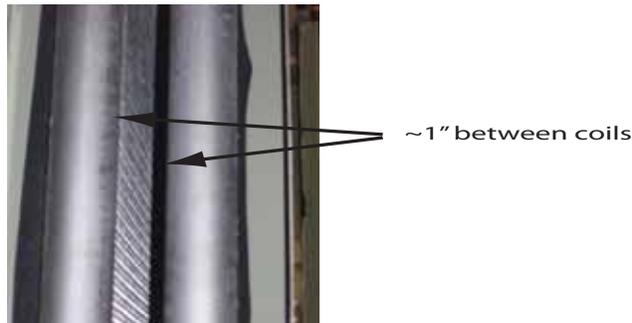


Figure 7. Goodway's Wonderwand with 90° attachment



Repair / Replacement of Microchannel Coil

Microchannel coils are considerably more robust in design than tube and fin condenser coils, however they are not indestructible. When damage or a leak occurs in the field, it is possible to temporarily repair the coil until another coil can be ordered. If the leak is found to be within the tube area of the coil, a field repair kit (KIT16112) is available through your local Trane parts center. Because of the all aluminum construction and aluminum's high thermal expansion rate, a leak located at or on the header assembly is considered irreparable.

Refrigerant Evacuation and Charging

WARNING

R-410A Refrigerant under Higher Pressure than R-22!

The units described in this manual use R-410A refrigerant which operates at higher pressures than R-22 refrigerant. Use ONLY R-410A rated service equipment or components with these units. For specific handling concerns with R-410A, please contact your local Trane representative. Failure to use R-410A rated service equipment or components could result in equipment exploding under R-410A high pressures which could result in death, serious injury, or equipment damage.

WARNING

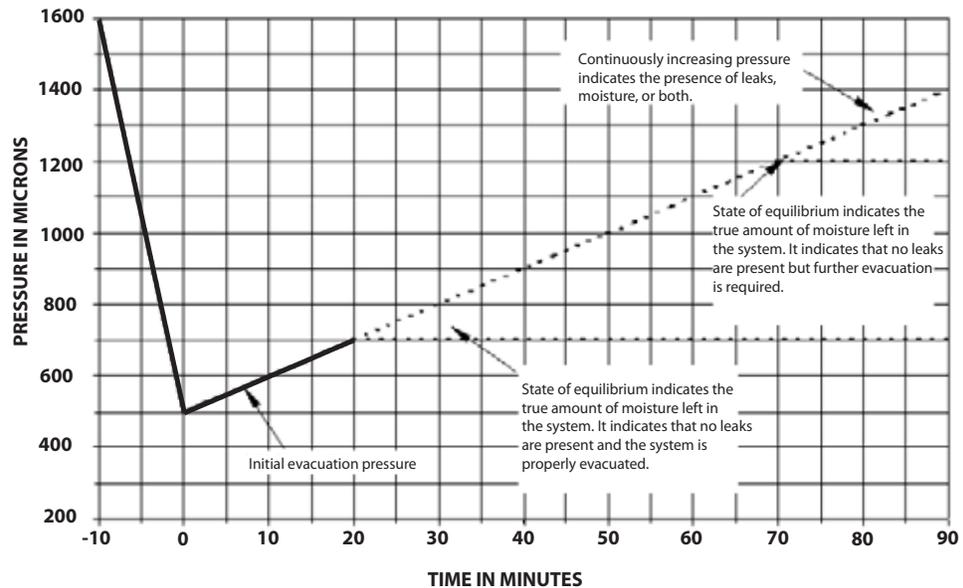
Refrigerant under High Pressure!

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives. Failure to recover refrigerant to relieve pressure or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in an explosion which could result in death or serious injury or equipment damage.

The unit is fully charged with R-410A refrigerant from the factory. However, if it becomes necessary to evacuate or charge the refrigerant system with refrigerant, it is important that the following actions and guidelines are taken.

- Do not release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state, and local laws.
- Be sure to follow any specific instructions contained in the unit's Installation Operation and Maintenance (IOM) manual pertaining to refrigerant evacuation and charging.
- To prevent cross contamination of refrigerants and oils, use only dedicated R-410A service equipment.
- Disconnect unit power before evacuation and do not apply voltage to compressor while under vacuum.
- Due to the presence of POE oil, minimize system open time. Do not exceed 1 hour.
- Please refer to unit's nameplate data, Installation Operation and Maintenance (IOM) manual or Service Facts for proper refrigerant charge amounts.
- Before charging system with R-410A refrigerant perform a standing vacuum test. Evacuate the system to 500 microns or less vacuum gauge pressure. Let the system equalize for approximately 15 minutes. This is referred to as a "standing vacuum test". The maximum allowable rise over a 15 minute period is 200 microns. If the pressure rise is greater than 200 microns but levels off to a constant value, excessive moisture is present. If the pressure steadily continues to rise, a leak is indicated. [Figure 8](#) illustrates three possible results of the "standing vacuum test". If a leak is encountered, repair the system and repeat the evacuation process until the recommended vacuum is obtained.

Figure 8. Evacuation time vs. pressure rise



- It is recommended that the compressor be off when the initial refrigerant recharge is performed.
- When recharging R-410A refrigerant, it should be charged in the liquid state.
- It is recommended that the initial refrigerant be charged into the liquid line prior to starting the compressor. This will minimize the potential damage to the compressor due to refrigerant in the compressor at startup.
- If suction line charging is needed to complete the charging process, only do so with the compressor operating. This decreases both the probability that the compressor will start with refrigerant in the compressor oil sump and the potential for compressor damage.

NOTICE:

Compressors Failure!

Unit must be powered and crankcase heaters energized at least 8 hours BEFORE compressors are started. This will protect the compressors from premature failure.

- Allow the crankcase heater to operate a minimum of 8 hours before starting the unit.

Repair Procedure

If the leak is found to be within the flat refrigerant tube area of the coil a field repair kit is available through your local Trane parts center.

MC Repair Kit P/N: KIT16112

Contents of the aftermarket parts repair kit:

- Tube Brush
- Epoxy Sealant
- Alcohol cleaning pad
- Sand paper
- Instruction Sheet
- Aluminum Wrapper

Required Tools:

- Heat Gun; Part (TOL00182) is available within the Trane Parts Centers.
- PPE (gloves, safety glasses, fire retardant clothing where applicable)
- Small to medium size needle nose pliers

1. Locate the source of the leak.

Figure 9. Leak



⚠️ WARNING
Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

2. Disconnect Power to the unit.

⚠️ CAUTION
Sharp Edges!

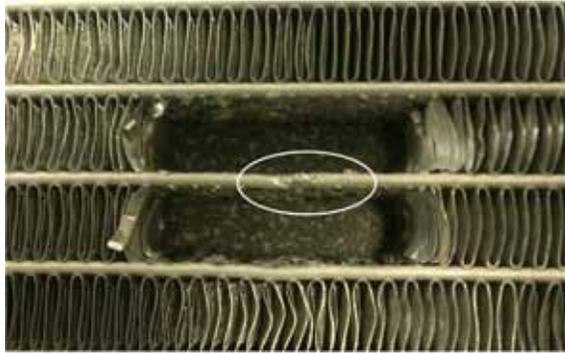
The service procedure described in this document involves working around sharp edges. To avoid being cut, technicians **MUST** put on all necessary Personal Protective Equipment (PPE), including gloves and arm guards. Failure to follow recommendations could result in minor to moderate injury.

3. Dress with proper personal protection equipment (PPE) gear before attempting any field repairs. Aluminum fin material is extremely sharp, please be sure to wear gloves and protective eye wear.
4. Evacuate any remaining refrigerant in the damaged coils circuit.
5. Using needle nose pliers, clear away approximately 1" (½" of fin material from each side of leak) in order to gain sufficient access to the repair area (Figure 10 and Figure 11).

Figure 10. Clear away approximately 1" of fin material



Figure 11. Leaky area cleared away



6. Prepare the aluminum wrapper by cutting it to approximately 2" in length and folding it in half. The aluminum wrapper should look similar to [Figure 12](#) once complete.
7. Using the aluminum oxide sandpaper remove any rough edges on upper and lower portion of the tube and also scuff the inside the aluminum wrapper.
8. Remove the powder flux from the repair area by vigorously brushing the upper and lower portion of the tube with the round wire brush.
9. Clean the surfaces with the supplied alcohol pad in order to remove any dirt, debris and/ or oils. Allow the surfaces to fully air dry.
10. Combine 2 equal portions of the two part epoxy together.
11. Apply the epoxy with the application tool to the leak area and along the cleared fin section.

Figure 12. Apply epoxy to the leaky area



12. Place a small portion of remaining epoxy to the inside of the aluminum wrapper.

Figure 13. Apply epoxy to the aluminum wrapper



13. Place the aluminum wrapper over the leak area.

Figure 14. Place the aluminum wrapper over the leak area



14. Lightly "crimp" the aluminum wrapper with the needle nose pliers.

Figure 15. Crimp the aluminium wrapper with needle nose pliers



15. With use of a heat gun apply equally distributed heat to the repaired area for roughly 15-20 minutes until epoxy changes from red to gold in color. Allow an additional 30 minutes for epoxy to cure before leak checking the system.
16. Evacuate system down to 500 microns or less vacuum gauge pressure, following procedures listed under ["Refrigerant Evacuation and Charging," p. 8](#) for a standing vacuum test.
17. Be sure to follow any specific instructions contained in the unit's Installation Operation and Maintenance (IOM) manual pertaining to refrigerant evacuation and charging.
18. Recharge unit with refrigerant. Please refer to unit's nameplate data, Installation Operation and Maintenance (IOM) manual or Service Facts for proper refrigerant charge amounts.

Coil Replacement

Coil replacement procedures can vastly change depending on the unit type. Below are some guidelines to follow when replacing microchannel coils.

- Check with your local Trane Parts Center to determine if your damaged coil is set up for mandatory return. Should the return of your coil be necessary, please be sure to completely fill out all documentation or forms. Failure to complete documentation could result in reversal of claims associated with the coil failure. If your coil is not set up for return please be sure to dispose of coil following any local, state or federal laws.
- If the damaged coil is required to be returned, make sure that the shipping crate is kept intact and reused for shipping the coil back to the manufacturer.
- Reference HVAC Knowledge Center waves below for more detailed instructions on Microchannel coil removal.
 - Replacing the MC coil on Large Commercial Unitary Equipment - WAVE60623
 - Replacing the MC coil on Light Commercial Unitary Equipment - WAVE60624
- Do not set any removed panels on the microchannel coil and ensure that the panels do not accidentally fall into other coils.
- Coils are considerably lighter than traditional tube and fin coils. This means two men should be able to remove coil from the unit without any problems. However for easier removal, lifting lugs are built onto the coil.
- Only the damaged microchannel section or slab needs to be replaced.
- Inspect gasketing material attached to support frame and replace if necessary.
- Carefully remove the replacement microchannel coil from its shipping container. Visually inspect the coil for any damage.

NOTICE:

Coil Damage!

When brazing in the new Microchannel coil, the temperature at the copper - aluminum joint MUST NOT exceed 465°F (240.5°C). Failure to follow this requirement could result in coil damage.

- Please be sure that when brazing in the new coil that the temperature at the copper - aluminum joint DOES NOT EXCEED 465° F (240.5°C). This can be accomplished by placing a wet rag or heat paste over the plastic sleeve during the brazing process.
- If applicable, please be sure that the splatter shield tape (GKT04360) is received at the job site prior to coil removal.
- Please be sure to use the supplied aluminum splatter shields when brazing in the replacement coil to protect the coil from galvanic corrosion associated with splatter during the brazing process.
- Evacuate system down to 500 microns or less vacuum gauge pressure following procedures listed under Refrigerant Evacuation and Charging for a standing vacuum test.
- Be sure to follow any specific instructions contained in the unit's Installation Operating and Maintenance (IOM) pertaining to refrigerant evacuation and charging.
- Recharge unit with refrigerant. Please refer to unit's nameplate data, Installation Operating and Maintenance (IOM) manual or Service Facts for proper refrigerant charge amounts.

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