

COOLING TOWER AND CHILLER CLEANING PROCEDURES

We offer two ways to clean a cooling tower/chiller. The first being a mechanical cleaning and the second being a chemical cleaning. At times, you may have to encompass both methods in order to accomplish the task at hand. Consult your water treatment rep. and have him assist you in determining the best procedure.

Chemical cleanings involve three distinct separate procedures. One being the use of a dispersant to loosen biomasses and get into difficult areas.. The second being the use of acid for severe scaling. The third is a disinfection for bacteria and Legionella prevention and elimination. You have to determine which method is best suited for your situation. You may have to use a combination of the three in some cases. Consult your water treatment specialist if you have any questions.

COOLING TOWER PRE-CLEANING PREPARATION

Whether you are mechanically or chemically cleaning a cooling tower, these steps must take place first. It is important that each step be adhered to. The order of the steps can be fluctuated but each step must be done to insure your safety.

1. The tower must be isolated from the system. Turn off and secure the electrical service to the tower. Be sure the tower fan is off, the main circulating pumps are off, and the temperature sensors are off or put in a none operational mode. Lock out and tag out the main power switch.
2. Close the valves that supply and return water to and from the tower.
3. Close the make up water valve to the tower.
4. Open bottom drain of the tower. Remove overflow pipe.
5. Remove the grate covering the suction intake for cleaning if possible.
6. Have a separate garden hose ready, charged, and place in tower once the tower has been drained out. Have your squeegee, broom, and shovel ready and place in tower.
7. Suit up with water proof boots, coveralls, gloves, hat, and face protection.
8. Begin your cleaning. Once cleaned, reverse the procedure for startup.

MECHANICAL CLEANING

This type of cleaning will involve the use of a power washer, a garden hose with power spray nozzle, shovel, broom, and squeegee. This type of cleaning is designed to remove all algae, slight scale, dirt, mud, and collected debris. The purpose is annual cleanings and removal of dirt to regain cooling performance. At times it is strictly cosmetic.

Starting at the hot deck, using the pressure washer, wash cooling tower blades, screen, inside of exhaust collar, and hot deck. Remove the covers of the hot deck and be sure all drain holes are free of scale and debris. Wash entire area where water flows to the fill. Make note if any spray nozzles are missing or broken. Inform chief engineer if they are.

Be careful when cleaning the fill with a pressure washer. The pressure and stream will cause the fill to break easily and snap off. Use a spray stream and not a straight stream. Clean the fill from top to bottom, outside and inside. Wash the sump area, also outside and under the fill.

Clean the inside of the tower fill, top to bottom, the walls, and under the fan blades. Remove all signs of algae, dirt and debris from float valve. Using the shovel or squeegee, be sure the floor of the sump is clean and free of all mud and deposition. Use your hose to clean under fill and inside of fill. After wash out is over, check to be sure no loose scale has broken off and isn't lodged somewhere in the bottom of fill.

When finished, shut the drain, reset over flow pipe, and open the make up valve to refill tower. Add sufficient chemical for startup. Consult with your water treatment rep. for the correct amount of chemical to add to the tower. Once the tower is filled, slowly open supply and return valves. Tower may add more water once the supply and return valves are open as to displace trapped air. Remove lock out and tag out materials. Have chief engineer inspect tower and have him start electrical service to start tower. Watch the water level to be sure it remains at sufficient levels for operation. Once tower is in service, have chief engineer sign off on your report that tower cleaning is completed.

CHEMICAL CLEANING

This is much more involved than a mechanical cleaning. You need to first establish the purpose of the chemical cleaning. This is very important. Consult with your water treatment rep. There are several steps/tests that need to be performed prior to the actual cleaning. This is very important.

Types of Chemical Cleaning

The use of a biocidal dispersant alone will help remove dirt and loosen bio masses for easy removal. This is the most favorable, safest, and easiest type of chemical cleaning. The use of a biocidal dispersant along with either an algaecide (chlorine) or biocide will insure that all biomasses, silt, and deposition are reduced and can more easily be mechanically removed.

If a tower has not been used, is in a stagnant state or is highly fouled and needs cleaning, a bacteria test must be performed first to determine bacteria levels. If bacteria levels exceed the Center of Disease Control's regulation of ten to the fifth levels, the tower must be disinfected. High levels of chlorine and sodium bromide are to be used along with a biocide, either glutaraldehyde or isothiazalin, and a biocidal dispersant to insure that all traces of biological growth are killed. These chemicals must be recirculated for 2-6 hrs. before the actual mechanical cleaning process begins. Tower must be retested for bacteria conditions prior to discharge of chemicals and the mechanical process can begin.

SCALED COOLING TOWERS AND CHILLERS

If a tower is heavily scaled, and an acid cleaning is determined to be the most effective way of reducing or removing the scale, your water treatment specialist must be contacted. He will determine the type and amount of acid that is needed to descale the tower. Once the correct acid is determined, the acid will be added via a special chemical tank and recirculating pump. The solution will be recirculated for several hours. Once the acid has exhausted itself (determined by a pH test and physical inspection), it is neutralized and then dumped. If a second application is needed, the water treatment rep. will reapply the solution with new acid and recirculate it for several more hours. Once the water treatment rep. determines that the scale has been dissolved, or loosened off where it can be mechanically removed, he will neutralize the solution, retest, and drain the tower. This will insure that the internal portion of the tower is safe to begin the mechanical cleaning. Safety is primary at all times. Be sure the service rep. is completely dressed and covered before entering the tower.

Your water treatment rep. will analyze the scale and determine the most effective acid to use to dissolve the scale. The neutralization process involves a blend of caustic chemicals to insure that the

tower solution has a pH of 7.0 to 7.4. before discharge. This is a time consuming process and requires a great deal of work to insure the safety of the service reps. Time and materials plus labor are charged for this process.

The mechanical cleaning is the least costly of the three processes. The disinfection is next followed by the descaling. The water treatment division will work hand in hand with the service reps. who are assigned to clean a tower.

Consult with your water treatment rep. if you have a tower cleaning scheduled. This will give him sufficient time to order the necessary chemicals and materials based upon his review. We want to make your job easier and insure your safety.

Cleaning Air-Cooled Condenser Coils

Refrigeration systems that employ air-cooled condensers will greatly benefit from a regular maintenance program. Regularly scheduled maintenance saves the contracting company and the customer time and money.

One of the most important tasks is to inspect and clean the condenser coils. An excessive amount of dirt on the coils increases the operating discharge pressure. Systems running with higher-than-normal discharge pressures reduce the life of the compressor, reduce its refrigeration capacity, and consume more energy.

As the running discharge pressure increases, so does the power consumed by the compressor. The power consumption of the compressor could easily increase 10% to 30% with a sufficient increase in its discharge pressure. The actual pressure will vary depending on the type of compressor, its application, and the refrigerant used. For the actual increase, you need to refer to the compressor's performance data sheet.

The reduction in refrigeration capacity means the system will now need to run longer to refrigerate the same load, further increasing the power consumed by the compressor. With the combination of longer run times and increased power consumption, it is easy to see the importance of keeping the condenser coil clean and its operating discharge pressure within normal operating parameters.

There are several ways to effectively clean condenser coils. Coils that do not have a heavy buildup of dirt or grease can usually be cleaned with a good wire brush. Coils with a mild amount of buildup could be cleaned with a soapy water solution.

Coils with a heavy buildup of dirt or grease may need to be chemically cleaned. This would entail using some type of acidic or alkaline-based chemical. Both types of chemicals have advantages and disadvantages. It is best to consult with the manufacturer of either the equipment or the chemical for recommendations.

When cleaning a condenser coil, it is important to not damage the fins or the coil surface. A condenser coil can be easily damaged, and that could restrict the airflow through the coil, resulting in even higher discharge pressures than before the coil was cleaned.

If the coils need to be chemically cleaned, the technician should carefully follow the directions from the chemical manufacturer. The tech should make sure the coil has been thoroughly flushed with fresh water after applying the chemicals per the manufacturer's recommendations. Chemicals left on the coil could easily deteriorate the fins' surface and possibly the tubing itself.

There are no real specifications on the frequency of coil cleaning. It is solely based on the ambient conditions surrounding the coil. Some coils may need to be cleaned every month, while others may only need to be cleaned yearly or perhaps at even longer intervals. Each unit should be looked at on a case-by-case basis.

With the continued focus on energy usage today, it is important to keep the condenser coils clean, not only to reduce energy consumption, but also to extend the life of the equipment.

Marchese is owner of Arctic-Air Refrigeration in Pittsburgh, PA.

Publication date: 06/04/2001

Chemical Rydlyme® Cleaning



Severe scale-calcium buildup on a Trane Absorber



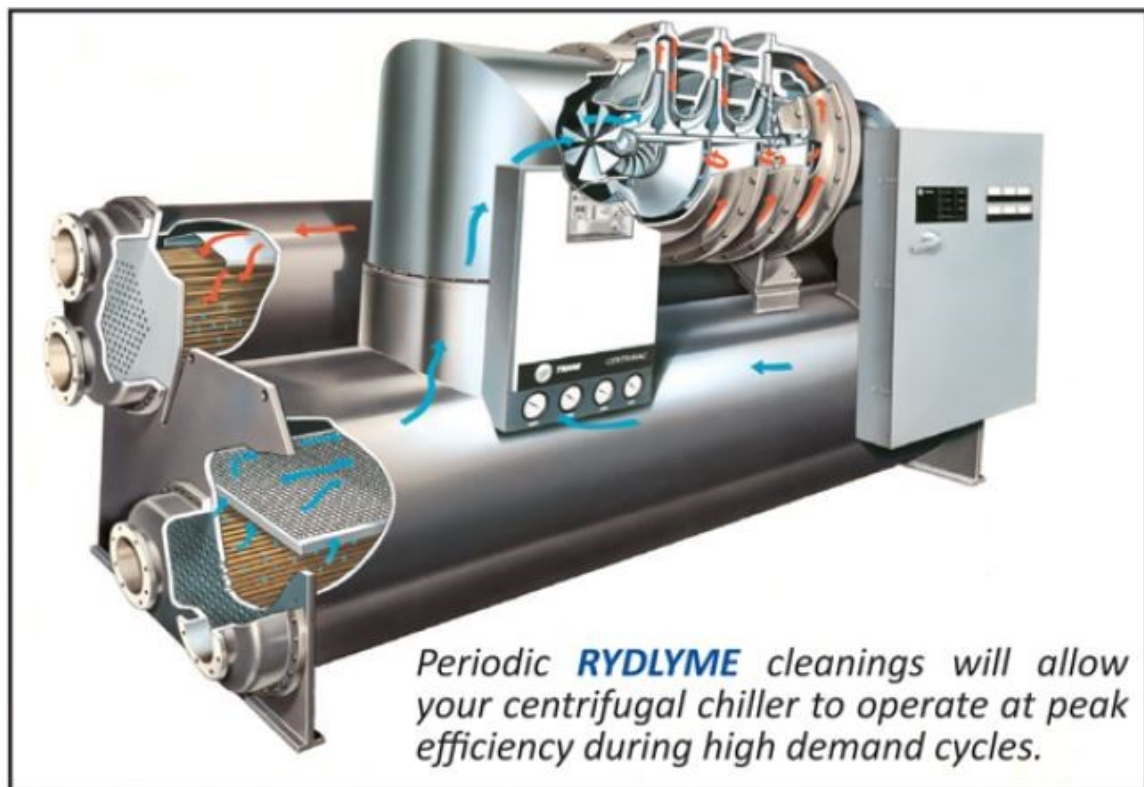




Condenser & Chiller Services is a stocking distributor of Rydlyme® products. Rydlyme® cleaning agents are specially formulated to dissolve the toughest water scale, calcium, lime, and other deposits from virtually any condenser, absorption unit, chiller, or other water-based equipment. We provide complete chemical pumping and flushing services, as well as mechanical brush cleaning after the Rydlyme® dissolves the scale and rust.

This environmentally-safe, citric-acid type solution can be used in any non-ferrous equipment (except aluminum), and is perfect for any commercial, industrial, or municipal application, from hotels and high-rise apartment buildings to universities and hospitals. It is used in copper, brass, cupro-nickel, stainless steel, and carbon steel heat exchangers every day. The U.S. Navy uses this product as well

as the commercial marine and cruise ship industry. We sell it to hundreds of contractors who use it extensively on cooling towers, and condenser systems as well.



Powerful & Safe

Rydlyme® is powerful and fast-acting, yet totally safe for personnel, equipment, and the environment.

- Non-toxic
- Non-injurious
- Non-flammable
- Non-hazardous
- Non-corrosive
- Biodegradable

Benefits of Rydlyme®

- Meets less stringent approval and disposal requirements
- Can be used by in-house personnel, eliminating outside labor costs
- Costs less to ship than harsh, hazardous acids and chemicals
- Extends equipment life and lowers capital equipment costs
- No elevated temperatures are required during cleaning
- NSF certified for use in food, beverage, and pharmaceutical processing facilities

- Saves you money by returning equipment to service faster

Effective & Easy to Use

Add Rydlyme® to your condenser, cooling tower, or other equipment, and run it through the system with a circulating pump. The recirculating action brings the active solution in Rydlyme® into contact with deposits, dissolving them as coffee does sugar—there is no residue left behind. Your equipment does not need to be neutralized or pacified after using Rydlyme® —the solution can be rinsed safely down the drain.

Rydlyme® will dissolve calcium, lime, rust, and other harmful deposits quickly, thoroughly cleaning your equipment in a matter of hours. In some instances, Rydlyme® can be used to clean equipment while it is still in operation. It is effective for system components of any material, including fiberglass, copper, bronze, galvanized steel, and stainless steel. It is not recommended for aluminum.

All heat exchanger and condenser tubes should be mechanically brush cleaned after a Rydlyme® cleaning for maximum effectiveness and to remove the softened scale.



Rydlyme Quantities Requirements

Quantities of RYDLYME to Clean Water Side of Shell & Tube Heat Exchangers

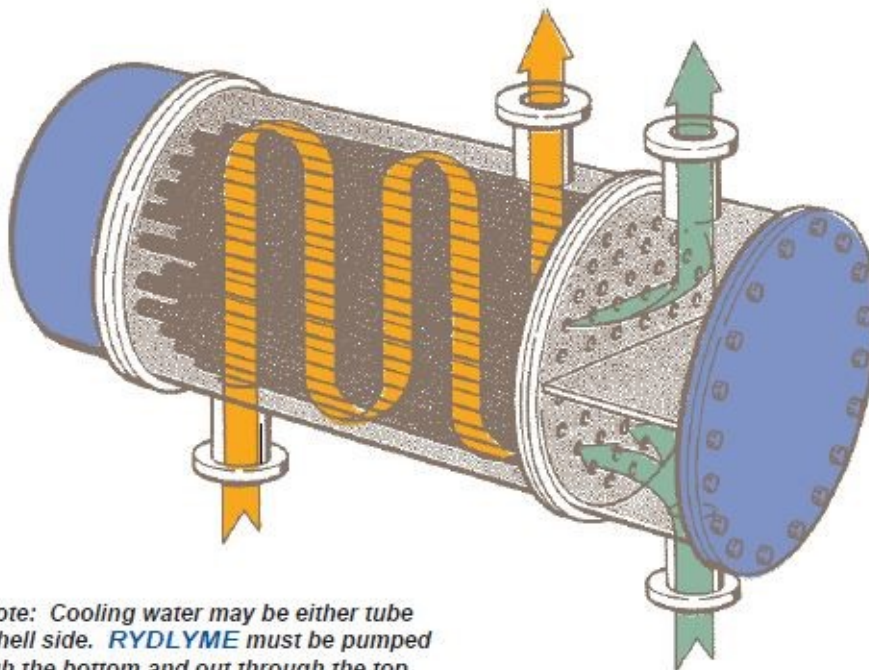
		Length in Feet												
Diameter in Inches		4'	5'	6'	8'	10'	12'	16'	18'	20'	24'	30'	36'	40'
	4"	1	1	1	2	2	2	3	3	3	4	5	6	6
	5"	1	1	2	2	3	3	4	5	5	6	8	10	10
	6"	2	2	3	3	4	5	6	7	7	9	12	15	16
	8"	3	3	4	5	7	8	10	12	13	16	20	25	30
	10"	4	5	6	8	10	12	16	18	20	25	30	40	45
	12"	6	7	9	12	15	18	24	27	30	35	45	55	60
	16"	10	13	16	21	25	30	42	50	55	60	80	95	110
	20"	16	20	25	32	40	50	65	75	80	100	120	150	160
	24"	25	30	35	50	60	70	95	110	120	140	180	220	240
	30"	35	45	55	75	90	110	150	165	180	220	280	330	360
	36"	55	65	80	110	130	160	220	250	275	330	400	495	550
	40"	65	80	100	130	160	200	260	300	330	400	500	600	660
	44"	80	100	120	160	200	240	320	360	400	475	600	720	800
	48"	100	120	140	190	240	280	380	425	480	560	710	850	950
	50"	105	130	160	210	260	315	415	470	520	625	780	935	1040
	54"	120	150	180	240	300	360	480	540	600	715	895	1075	1195
	60"	150	185	220	295	370	445	590	665	740	885	1105	1325	1475

Gallons of **RYDLYME**

fig 1.1

 = 1 Hour	 = 3 Hours	 = 5 Hours	 = 7 Hours
 = 2 Hours	 = 4 Hours	 = 6 Hours	 = 8 Hours

**For every gallon of RYDLYME recommended above,
one gallon of water must be added!**



*Please note: Cooling water may be either tube side or shell side. **RYDLYME** must be pumped in through the bottom and out through the top.*

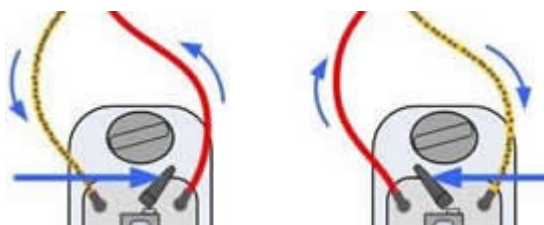
Request a quote on Rydlyme® cleaning chemicals for your application, or [contact us](#) to schedule on-site cleaning service.



DESCALING CHEMICALS



DESCALING GUIDES



In hard water areas, the use of water in heating and cooling systems invariably results in a build up of limescale (hard water) deposits within the system, usually in the highest temperature zones. The resultant scale not only restricts water flow, but acts as a very effective insulant, reducing heat transfer efficiency and increasing running costs.

Heavy scale deposits can also lead to localised overheating of heat transfer surfaces, resulting in premature failure of heating appliances.

In all areas, rust and corrosion may take place in heating and cooling systems, leading to a build up of corrosion deposits and a reduction in efficiency.

Kamco has a full range of [SCALEBREAKER TANK MOUNTED DESCALING PUMPS](#) purpose built for descaling and chemical cleaning of heating plant, heat exchangers and cooling systems. All units incorporate pump, tank, flow reversing device, hoses and fittings in a neat, portable unit that safely contains chemicals during descaling.

Applications include descaling chillers, condensers, heat exchangers, domestic boilers, calorifiers, steam generators and boilers etc, and descaling and cleaning cooling coils and pipe work of equipment ranging from injection moulding machines to synchrocyclotrons.



For use with tank mounted pumps, Kamco has a range of carefully inhibited descaling chemicals and associated descaling products, detailed on the [SCALEBREAKER DESCALING CHEMICALS](#) page. For advice on the correct pump and chemical for any application, contact our telephone help line.

How to use your Kamco Descaling pump

PLEASE FOLLOW THESE INSTRUCTIONS TO AVOID OPERATING OR SERVICING PROBLEMS

Fill the tank with sufficient descaling solution to ensure that the pump rotor housing is submerged during use. The minimum liquid level is shown on the "CAUTION" label on the tank.

Screw the outer ends of the flow and return hoses securely to the plant or equipment to be descaled, using BSP threaded adaptors & PTFE tape if necessary. Connect the power cable to a suitable earthed power supply (220 or 110 volt [50 cps], according to model). As the pump will be used in a damp location, we recommend that a residual current circuit breaker plug top be used.

Switch on the pump, and check to ensure that the liquid level does not fall below the level of the rotor housing (see above), as some of the contents of the tank enter the equipment being descaled, particularly when the overall capacity of the system being descaled is greater than the tank capacity of the pump. If necessary, add more descaling solution, or water. Check all connections for leaks.

During use, the tank cap should rest on top of the screwed stem, but should not be screwed on by more than a quarter turn, to allow for the passage and elimination of the gas evolved during descaling. Check that the foam level does not exceed the maximum filling level. If necessary, carefully add [FOAMBREAKER](#) to the solution.

The built-in flow reverser makes it possible to attack scale from both directions. During descaling periodically move the flow reverser handle from one stop to the other. This reduces descaling time considerably, and is more effective in flushing out any solid matter, which will accumulate on the circumference of the base of the tank. By attacking scale from both sides it is possible to clean piping which is almost totally obstructed.

Scale removal can be considered complete when bubbles no longer form in the return pipe, and the solution is still acidic.

[SCALEBREAKER DESCALING CHEMICALS](#), with a built-in colour change to allow acid strength to be monitored visually, are available from KAMCO.

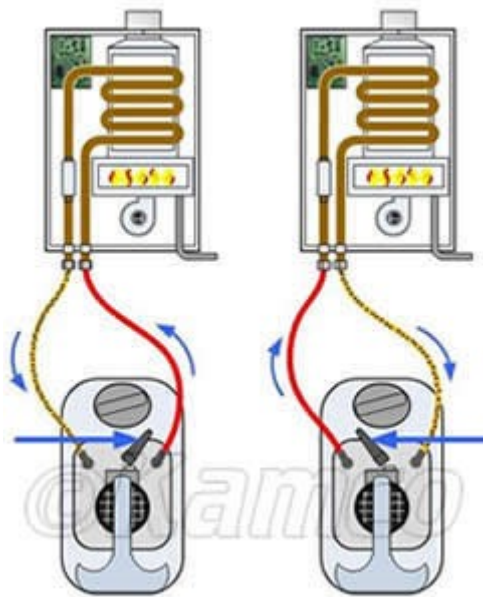
Caps should be kept securely on all chemical containers whilst not in use. As a matter of prudence, and to avoid splashes, operators should avoid standing directly over the open neck of either chemical containers or the filling neck of the descaling pump whilst pouring or adding chemicals.

If the pump is not to be used for a period of time, wash out the pump after use by circulating clean water through it, to prevent any residues of descaling process from drying and 'gumming up' the rotor.

[CLICK HERE TO SEE OUR RANGE OF SCALEBREAKER DESCALING PUMPS](#)

When working with acidic descaling chemicals always wear suitable protective clothing and goggles, and check and observe instructions supplied with descaling chemicals.

PLEASE OBSERVE THESE PRECAUTIONS:



1. Temperature of the descaling / flushing solution must not exceed 50°C. Higher temperatures may warp the rotor cover. Monitor temperature closely when descaling plant / equipment which may already have a high temperature, such as the domestic water coil in storage water heaters, or large plastic injection moulding tools.
2. Do not dissolve solid or crystalline descaling chemicals directly in tank, as this may choke the pump inlet and cause abrasion damage. Dissolve such chemicals in a bucket first.
3. Always keep pump upright, particularly in transit, to avoid any liquid penetrating lower electric motor bearing, or lower electric motor bearing may wear prematurely.

Automatic Tube-cleaning of Seawater-cooled Condenser

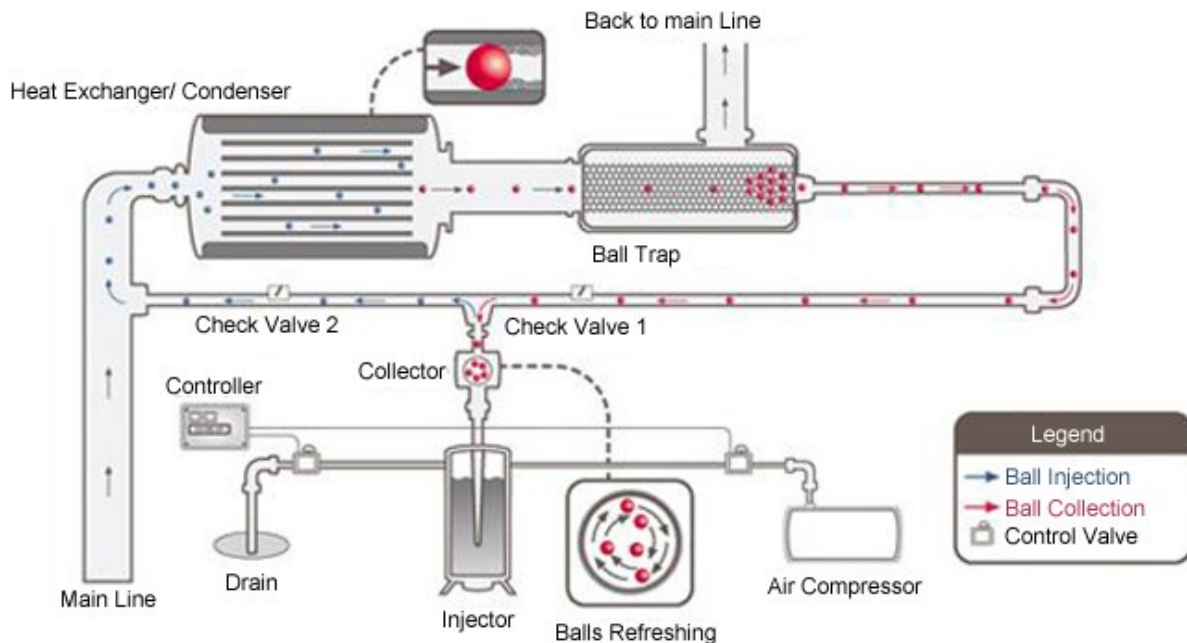
In a water-cooled air conditioning system, heat is rejected from the refrigerant to the cooling water in the condenser. The impurities in the cooling water circuit are accumulated, and thus the scales and deposits are built up in the condenser tubes, creating fouling problems on the condenser heat transfer surfaces. When fouling and scaling in the condenser increase, the efficiency of the condenser will deteriorate and thus increase chiller energy consumption.

The automatic tube cleaning system is usually installed as an integral part of the condenser. The system cleans the condenser tubes by circulating a number of soft sponge balls through the tubes at pre-set time interval. Since the balls are soft and light in nature, they will not cause any damage to the condenser tube surface and can be carried easily through the tubes by the flowing of water.

Automatic tube-cleaning System

Application

Automatic tube cleaning for seawater-cooled chiller installed at China Ferry terminal



Automatic tube cleaning installed at the pipe work



Tubes before cleaning



Tubes just after manual cleaning



Tube after 300 hours operation with ATCS



Cleaning of Internal Tubes of Chiller Condenser.

Hey guys!.. I have a question in cleaning of Internal Tubes of the Chiller Condenser. Nylon Brush is commonly use in cleaning a tube or in a term in swabbing. Is the Combination brsh can help to clean internal tubes of a chiller>or their is a bad effect in a tubes? Because, nylon brsh cannot remove all dirt inside the tubes. The "combination brsh" is a nylon brsh with a bronze brush.

Sir, thanks for the reply, actually, the bronze brush is not actually a pure bronze, it is a combination of a nylon brush and bronze brush, it is efective in cleaning a tube?to remove the scale insdie the tubeS?or their is a bad effect in a tubes?can u rate in 1-10 the effect of the comnination brush in the tubes?the 10 highest bad effect to the tubes and 1 is lowest bad effect to the tubes?thank you for your reply.

The nylon brush is to remove debris only (dirt and sludge), it will not take scale or hard deposits off the tubes. The bronze brush will work to clean the tubes better for hard deposits. If it is scaled however you can run the tube cleaner for many hours with little to no results. Chemical cleaning is the only real solution for scale. As for damaging the tubes, I suspect the tubes do experience some damage from the bronze brushes but it should be negligible.

TANK MOUNTED PUMPS BUILT TO HANDLE THE STRONGEST DESCALING CHEMICALS

In hard water areas, the use of water in heating and cooling systems invariably results in a build up of limescale (hard water) deposits within the system, usually in the highest temperature zones.

The resultant scale not only restricts water flow, but also acts as a very effective insulant, reducing heat transfer efficiency and increasing running costs.

Heavy scale deposits can also lead to localised overheating of heat transfer surfaces, resulting in premature failure of heating appliances.

In all areas, rust and corrosion may take place in heating and cooling systems, leading to a build up of corrosion deposits and a reduction in efficiency.

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Applications include descaling chillers, condensers, heat exchangers, domestic boilers, calorifiers, steam generators and boilers etc, and descaling and cleaning cooling coils and pipe work of equipment ranging from injection moulding machines to synchrocyclotrons.

ANYONE CAN CLEAN A CONDENSER COIL, BUT HOW MANY DO IT RIGHT?

By Patrick the HVAC tech-guru

The answer to this question is; not many. This is one of those basic tasks that's so easy no one thinks they need to be taught how to do correctly; and as with all things that appear simple on the surface, there's a lot more to it than many technicians realize. In fact, it's one of those things that may be relatively simple, but it can be screwed up ten ways in the blink of an eye.

Speaking of eyes, before we go any further let's set some ground rules; Wear safety glasses when performing this work! If you have to use chemicals, protect yourself accordingly with the proper protective gear! Read the directions on the chemical solution label and follow them precisely!

Ok, let me hop off my soapbox and get started.

1) The first item I will address is coil cleaning chemicals. Every service truck I look into has at least four plastic jugs of assorted coil cleaning solution. Each has a label that includes information concerning the products use, safety precautions, and some form of slick "snake oil" type advertising that promises bright, shiny coils with minimal effort. No matter, I don't think anyone ever reads them, instead they pick the cleaner by color; pink for light dirt, blue for heavier dirt, yellow for coils located near Chinese restaurant kitchen exhaust fans. And by the way, everyone knows the green stuff is for evaporator coils and really doesn't do anything, but for some reason they always keep some on their truck. (Stop laughing, you know every bit of what I just said is true)

Here's what I think of this rainbow assortment of cleaning solutions; not much. It's not often you need them. (Ok, I admit it, you do need it for those units near a Chinese restaurant kitchen exhaust. Stop laughing!) What about those fancy chemicals that make the aluminum fins shiny? Who says the fins need to be shiny?! A brush, a vacuum cleaner, and a medium pressure stream of water are all you need to properly clean a coil. In fact, harsh coil cleaners will ruin some types of coils!

Coils that you never want to use a chemical coil cleaner on, unless specifically recommended by the manufacturer, are: E- Coat coils, Heresite coated coils, and **Micro channel coils** just to name a few. Using the wrong coil cleaner on these coils can destroy the protective coating and possibly the coil itself. The easy way to remember what type of cleaner to use is to not use any cleaner at all if you can help it!

2) The second item we need to address is how to properly access the coil surface that needs to be cleaned. I know what you're thinking; how dumb do you have to be to not know how to access the coil? The answer; Not very dumb at all! Many technicians don't realize that some condenser coils are arranged "sandwich" style (**Split-Fin**), meaning there are **multiple single pass coils that are sandwiched together**. You usually find this style coil on **rooftop units and commercial condensers**. On this style coil you need to separate the coil slabs and clean the coil faces in between. In fact, on this type of coil, the outer coil will be clean as a whistle (I'm not sure how clean a whistle is...) and the inner coil slabs will be completely plugged with dirt and pollen. (Anyone who has been in the trade more than a year will know **cottonwood is the worst!**)

Cooling Tower Maintenance

Condenser & Chiller Services, Inc. provides full-service maintenance and repair for cooling towers produced by Marley, BAC, Evapco, and other major [manufacturers](#). We also provide protective epoxy coatings, replacement parts, tower fill and more to help you get the most out of your system.

Cooling Tower Maintenance

Unavoidable factors such as chemicals, lime and/or calcium buildup, exposure to sun and the environment, and aging will cause cooling tower components to deteriorate, which can lead to heat exchange system failure.

Our skilled, experienced team will come to your location and replace the PVC fill cartridges, gaskets, and other sensitive components in your system. We use water blasting and grit blasting, as needed, to clean deposits from cooling tower basins of all sizes.

Cooling Tower Epoxy Coatings

Adding an epoxy coating can enhance flow performance and keep the tower cleaner for longer periods of time, reducing the risk of heat exchanger failure and extending the life of the cooling tower. We provide complete on-site epoxy coating service.

- Using a patented process, our technicians will remove all scale, rust and buildup from metal surfaces. Cleaned surfaces are then heated to draw out additional moisture.
- Our special flexible epoxy coating is applied by hand in multiple coats to a minimum dry thickness of 50 mils.
- Eroded areas are repaired with new sheet metal or built up with a flexible filler material to stop the leaks and refitted to accommodate new gaskets where required.
- After the epoxy coating has set (roughly 24 hours), we sand and prep gasket areas and chase all threaded bolt holes and studs to remove residue.
- All basin components are cleaned and vacuumed free of debris, and the equipment area is thoroughly cleaned.
- A one-year warranty is provided upon completion.

Cooling Tower Parts

We also furnish a variety of top quality parts from our distributors. We can supply the drift eliminators, motors, easy-float water level devices, and other replacement parts needed to keep your system running at its peak. Parts are available for you to install, or we can provide on-site installation as needed.

[Contact Condenser & Chiller Services](#) today for more information on cooling tower maintenance, coatings, and parts, or to schedule service. **Call us for immediate service at 800-356-1932.**

Chiller Tube Cleaning

Condenser and Chiller Services is a licensed contractor for chiller tube maintenance and cleaning. We specialize in total heat exchanger service, and provide complete, on-site, cleaning service of condenser, chiller, and heat exchanger tubes for all applications.

We utilize Goodway and T.C. Wilson tube cleaning tools for our chiller maintenance and brush cleaning. We also stock and sell Goodway and T.C. Wilson tools and cleaning products and provide service and repairs for the equipment.

Condenser and Chiller Services has designed our own custom-made brushes for cleaning heavily fouled condenser and chiller tubes. In many cases, these special cleaning brushes have actually saved our customers from tube failure and expensive retubing costs. We use specialized brushes with different bristle sizes, consistencies, and materials such as nylon, Spin-Grit textured bristles, brass, or stainless steel reinforced, etc.—to provide the most effective cleaning for every chiller system we

encounter. If our brushes can't clean the tubes, then Rydlyme chemical cleaning is the next best option.

Our chiller tube cleaning technicians will:

- Valve off your system's chiller
- Drain the condenser and/or evaporator
- Remove the heads and end covers
- Brush clean all condenser and/or evaporator tubes
- Clean all gasket surfaces, replacing gaskets as necessary
- Reassemble the system

Should it be requested, we can also eddy current test the tubes after cleaning to check for damaged or deteriorating tubes. We can also plug, or replace, severely damaged tubes should any be found.

[Contact us](#) or call us at 800-356-1932 for more immediate attention, with the model of your equipment so that we can better assist you in the repairs of your condenser, evaporator, or heat exchanger.

Eddy Current Tube Analysis



[Eddy Current Testing a 2000 ton York condenser that failed](#)

Heat Exchanger Failure: Myth or Fact?

Heat exchange systems have practically no risk of failure when they're new. In fact, some components have such nominal exposure that they are not apt to fail for years, if ever. After all, they have no moving parts. Is it a myth, then, that these vessels can fail catastrophically, resulting in extended downtime and loss of revenue for their owners? Unfortunately, catastrophic failure is a very real possibility.

Tubes within these vessels rest on steel supports, or sheets, about 1/4" or 1/2" thick, spaced along the length of the vessel. As the tubes expand and contract from temperature change, erosion occurs. However, the most damage is caused by tubes vibrating against their steel supports as fluid flows through them at high velocity (up to 1400 feet per minute or more).

As heat exchanger technology has advanced, and manufacturers look for ways to provide more efficient machines, the tubes have become thinner to facilitate better heat transfer. Where 16 gauge tubing was once the standard, modern devices have tubes with 22-24 gauge wall thickness. Internal rifling can make tube walls even thinner.

Every new Centrifugal, Reciprocating, Screw and absorption chiller manufactured in the last 15 years, has .028" wall tubes in them or thinner. Many new Chillers manufactured in the U.S. , Canada, Asia and Europe today, have .022" wall copper condenser and evaporator tubes in them.

Vibration wear, ongoing erosion damage, and thinner tube walls can combine to make the risk of failure dangerously high after a heat exchanger has been in service for just a few years. Galvanic corrosion, impingement, deposit and waterline attacks, crevice corrosion, Ant Nest corrosion, fatigue, stress cracking, and other forms of wear take their toll, as well. Unquestionably, heat exchanger vessels will deteriorate and fail if left unchecked.

An Eddy Test Can Prevent Future Problems

Another myth persists, as well: the common belief that you have to wait for tubes to fail before you know which ones to replace. In other words, catastrophe is unavoidable unless you replace all tubes, good or bad, before they fail.

Condenser & Chiller Services' eddy current tube analysis technicians, can identify damaged tubes before they fail, as well as good tubes that don't need to be replaced. This process is an easy, effective way to prevent heat exchanger failure and save you valuable time and money.

The eddy test has been employed in various fields on non-destructive evaluation (NDE) for years. In heat exchanger testing, a specialized impedance bridge device that generates a magnetic field is maneuvered through the tubes, causing eddy currents to flow. By analyzing the magnitude and depth of these currents, we can spot all manner of tube defects. We can see which tubes need to be replaced, and can provide retubing service to selectively remove and replace them with new tubes.

In-Service & Factory Eddy Test Services

Condenser & Chiller Services offers inline testing of in-service heat exchanger equipment. If your heat exchanger has been in use for more than three years, it should be tested for potential tube damage, and all heat exchangers should have eddy current tube analysis performed at least every three years.

For OEMs, we can eddy test your heat exchangers at the factory prior to shipping. Our baseline testing will ensure that your products are free of manufacturing defects and will perform at their peak.

Our Eddy Current Inspection analysts are highly experienced and can evaluate 1,200 to 1,600 tubes a day, depending on their length. This can be done on-site at your location for fast, efficient service with minimal equipment downtime. We have been providing this quality service for over 30 years. Our technicians are all ASNT-TC-1A certified to level II and Level III capacity. Since we are an ASME code shop with "U" and "R" repair certifications, we are also certified and inspected by Hartford Steam Boiler. No other Independent Eddy Current Company has this type of experience, background or certifications. We are independently certified by an outside NDT training company. As a licensed Contractor in several states, all of our technicians also have to train in the field and in our shop for the repair, maintenance and retubing of condensers, evaporators and heat exchangers on Carrier, Trane, York, McQuay, Smardt, Artic Chill, Chill-Con, Henry Technologies, Bell & Gosset, Dunham Busch, Ketema, Standard, Sanyo, Broad and Thermax chillers. This gives us the experience needed to properly diagnose and test your equipment.

[Request a quote](#) today, or [contact Condenser & Chiller Services](#) to schedule your Eddy Current Test. **Or, call us today at 800-356-1932**



Eddy Current Testing



York Condenser tubes were blown from freeze damage.



2,000 ton York centrifugal at the University of Utah



Eddy Current Testing York Centrifugal

Chiller Retubing

Heat exchanger tubes in water cooled condensers can wear out for any number of reasons, from contamination to simple aging. Condenser & Chiller Services provides compete chiller retubing service for open- and closed-loop water cooled condensers. As retubing specialists, we can step in to perform heat exchanger tube replacement for maintenance contractors who don't typically perform this service.

No matter what your application, we can provide full-service, on-site retubing, including labor and materials. Our technicians will:

- Remove old, damaged, or worn out copper tubing
- Clean and prep the tube sheets, and haul away the old materials
- Furnish the replacement tubes you need (or work with customer-supplied tubes)
- Install the new tubes, and roll them in place using electronic torque controls
- Assist you in pressure testing or hydro testing your heat exchanger or chiller
- Evacuate, charge, and assist you to replace the heads and restart the unit
- Recycle old tube materials and provide you with a salvage credit that can be deducted from your final bill

Condenser & Chiller Services can provide the replacement tubes you need, or work with tubing you supply. Whenever we retube a machine, we try to upgrade for greater energy efficiency. Thinner heat exchanger tube, with more FPI (fins per inch) and more capacity can give you significantly better performance from your system. We will work with you to find the ideal balance of efficiency and durability for your needs.

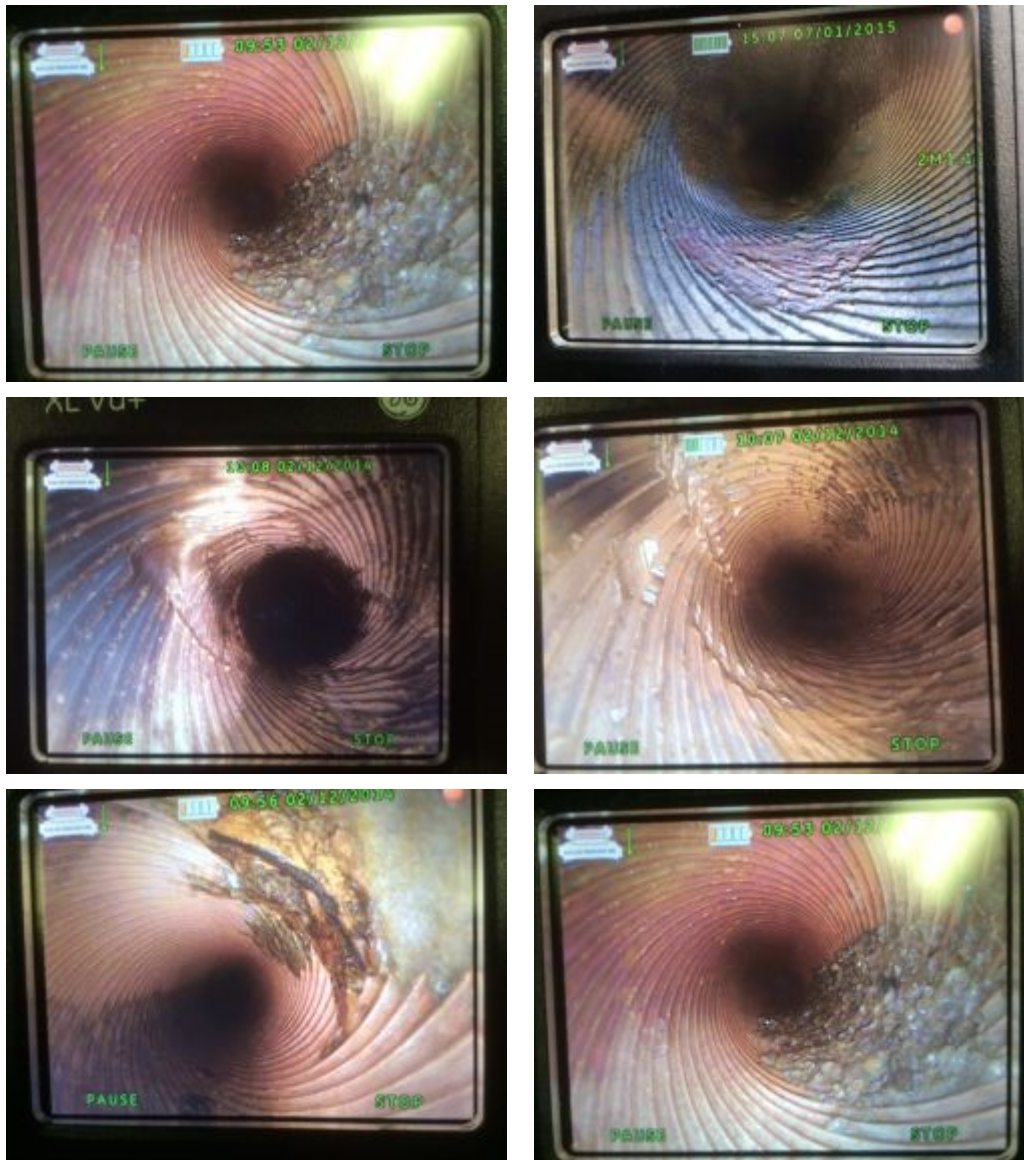
We stock a large inventory of [Cal-Fin tubes](#), in a range of alloys. All prime surface materials meet ASME B111 or ASME B543 specifications.

To lower overall retubing costs, we also provide [eddy current tube analysis](#) to help you identify which tubes need to be replaced. In hundreds of cases, only the damaged or worn-out tubes can be isolated and replaced through this process, leaving the good tubes behind. We can bring your heat

exchanger back to 100% capacity at a reduced cost by partially retubing the unit savings thousands of dollars.

[Contact Condenser & Chiller Services](#) today for more information or to schedule an appointment for chiller retubing.

Remote Video Inspection Services



Remote Video Inspection

Alongside Eddy Current non-destructive testing, video boroscope equipment can be a valuable tool in enhancing the quality of tube inspections. Our General Electric Acuvue boroscopes can truly reveal the extent of tube damage or fouling using high-resolution, magnified images of the inside of tubes that can be indispensable in determining the next step in a maintenance or repair solution.

Our technicians can set up these cameras directly onsite, allowing real-time viewing of the images the boroscope cameras see. We can also format these videos onto flash drives or DVD's for future records. This allows immediate feedback of the situation inside your tubes, and can establish a clear point of comparison for any future inspections to see the progress of any changes, positive or negative.

[Contact us](#) or call us at 800-356-1932 for more immediate attention, with the model of your equipment so that we can better assist you in the repairs of your condenser, evaporator, or heat exchanger.

Retubing Case Study



Non ferrous support system and Titanium tubes!

These pictures show our upgrade process in a high pressure steam generator. Typical failure is from corrosion and mechanical wear. We eliminate the problem with our custom designed non ferrous support system and Titanium tubes! Problem solved. We have over 20 installations completed with more than five years in service.

Belzona Epoxy Coating

[Before Epoxy Coating](#)



Introduction

All tubular heat exchangers use tubes to act as the medium over which heat energy is transferred, but it is often overlooked how the process is separated: the tubesheets and endcaps. Adverse conditions within the vessel can wear and thin the surfaces over time, and even minor damage in the wrong place can cause big problems. Erosion and corrosion that occurs around the sealing roll of the tubes can compromise the integrity of that seal, leading to unintended mixing of fluids which can be cause for shutdown and unexpected downtime. Repairing or replacing a significantly damaged tubesheet is both extremely costly and time-consuming, and can also require retubing depending on the damage sustained. This damage, however, can be mitigated or outright prevented, long before any risk of failure occurs.

A Preventative Solution

Coating exposed surfaces with materials like paint and epoxy is nothing new to most industries, and heat exchanger vessels are no exception. When a protective barrier is properly applied over exposed tubesheet and endcap surfaces, erosion and corrosion damage can be completely prevented. Even on already eroded surfaces, this protective coating can halt existing damage from getting worse. Furthermore, the coating can enhance the overall flow of fluid on the tube-side of the heat exchanger by reducing turbulence from buildup on the tubesheet surface. By extension, the coating can also prevent this buildup in the first place, which in turn keeps the tubes cleaner and less susceptible to damage.

Condenser and Chiller Services offers a full epoxy coating service that utilizes Belzona products that can protect and restore your heat exchanger tubesheets and endcaps to look and perform better than new. We can perform this service either at your jobsite as part of a scheduled shutdown, or at our facility in Chino, CA.

Our technicians first grit-blast all existing debris, rust, and fouling off the surfaces to be coated. This will expose the bare, clean metal, free from any corrosion, rust, or scale. They will then hand-mix and apply the Belzona epoxy product to all surfaces to be coated, being careful to keep the epoxy out of the tubing. The product is applied in two colors, both to ensure full coverage of the surface, and also the proper thickness of the overall coating for its long-term durability. Should it be requested, we can also convert any gasket surfaces to use full-face gaskets, which allow not only for more uses of the gasket between changes, but also the prevention of cracking on the new epoxy coated surface. After allowing at least 24 hours of curing time, the newly coated surfaces will be ready for service.

[Contact us](#) or call us at 800-356-1932 for more immediate attention, with the model of your equipment so that we can better assist you in the repairs of your condenser, evaporator, or heat exchanger.

For examples of our work with Belzona epoxy coating, follow the links to our case studies:

- [McQuay/Daikin Pasadena](#)
- [McQuay/Daikin Newport Beach](#)
- [Trane RTHB 250](#)
- [Trane CVHF 080](#)
- [Trane CVHF 1250](#)
- [York LA Crime Lab](#)

McQuay-Daikin Installation in Pasadena

2200 Ton McQuay Condenser





Problem:

The City of Pasadena power plant had a major corrosion issue due to chemical attack that required a complete retube of a 2200 Ton McQuay Condenser. The chemical also eroded some of the steel off the condenser tube sheets and heads.

Solution:

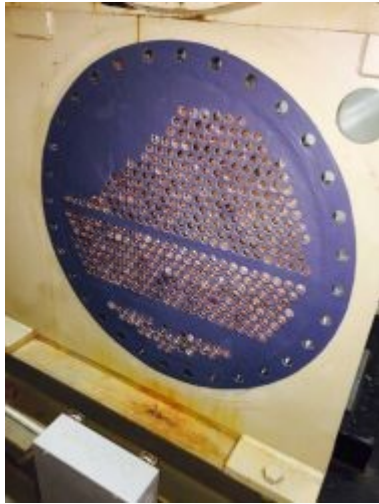
We furnished all of the labor and replacement tube materials and completely retubed the condenser. Once we finished the retube, we grit blasted and coated the condenser and heads with Belzona 1321 and also installed sacrificial anodes. We provided them with a 5 year warranty. Now the condenser stays cleaner, with no rust and we continue to provide ongoing inspection services to insure that they do not have this type of mishap again.

Please provide us your name, phone number, email address, location of equipment, model and serial# of equipment that you want us to help you with. Please provide a brief description of what you need or problems you are having with your equipment.

McQuay-Daiken Installation in Newport Beach

McQuay-Daiken Newport Beach



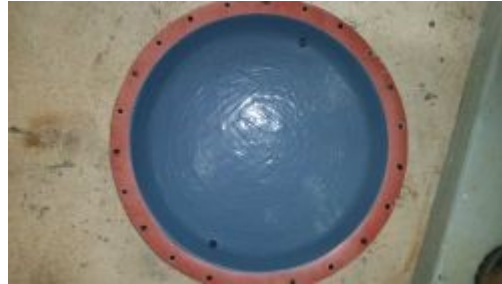


These photos are of a McQuay-Daiken WMC 230 ton condenser located in Newport Beach, California. It was only 1 year old and started to rust and corrode in the condenser. We grit blasted and Belzona coated it for the equipment manufacturer. We warranty our work for five years.

Please provide us your name, phone number, email address, location of equipment, model and serial# of equipment that you want us to help you with. Please provide a brief description of what you need or problems you are having with your equipment.

Trane RTHB 250





Finished Belzona Epoxy Coating on Tubesheet

Pictured on this page is a completed Belzona epoxy coating job, from start to finish, on a Trane RTHB 250-ton condenser located in Denver, CO. Click the photos to the right to expand them for more clarity.

The before pictures show the tubesheets and endbells before we started our work. Severe corrosion and rust 'nodules' mark the degradation of all affected surfaces, which left to their devices, can begin to erode the seal between tubes and tubesheets and allow leaks from the O-ring gasket surface.

Our technicians grit blasted all of this debris off of both surfaces so that clean metal is exposed, free from corrosion and rust. They then hand-mixed and applied the Belzona epoxy product to the all affected surfaces, without allowing any to enter the tubes. The coating is applied in two colors to ensure not only 100% coverage, but also proper thickness of the coating for its long-term durability. As a further measure, we eliminated the previous O-ring gasket area and installed new, full-face gaskets that allow two things: prevention of cracking on the new epoxy coating, and the ability to re-use the gasket two to three more times between changes.

[Contact us](#) or call us at 800-356-1932 for more immediate attention, with the model of your equipment so that we can better assist you in the repairs of your condenser, evaporator, or heat exchanger.

Trane CVHF 080

[Trane CVHF 080](#)



This is one of our Belzona coating jobs on a Trane CVHF 080 - 800 ton condenser that had rust and corrosion issues. As you can see from our completed pictures, we have made the condenser corrosion free and even made the customer new gaskets. The cleanup profile shows the close up of the tube ends.

Please provide us your name, phone number, email address, location of equipment, model and serial# of equipment that you want us to help you with. Please provide a brief description of what you need or problems you are having with your equipment.

Trane CVHF 1250

Trane CVHF 1250 condenser with damaged tubes, tube sheets and heads



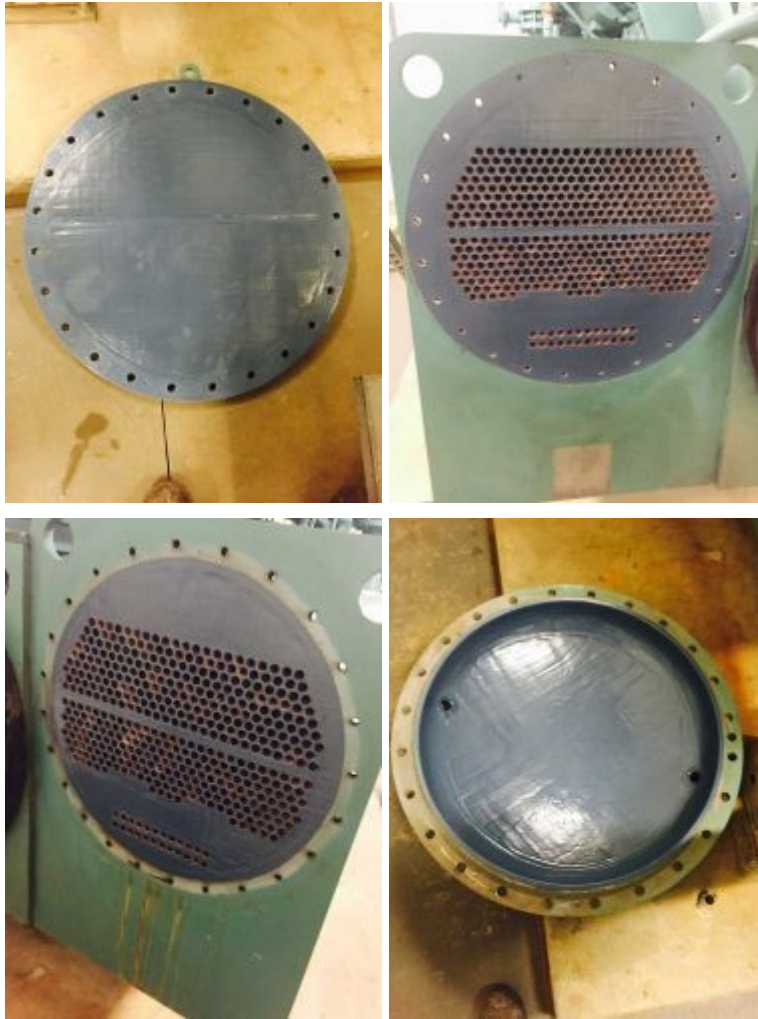
Here are pictures of a Trane CVHF1250 condenser with damaged tubes, corroded tube sheets and heads. This unit was losing refrigerant and taking on air. We plugged off a few tubes for the customer, blasted off the rust and corrosion and Belzona coated everything to stop any future damage.

Please provide us your name, phone number, email address, location of equipment, model and serial# of equipment that you want us to help you with. Please provide a brief description of what you need or problems you are having with your equipment.

York Project - LA Crime Lab

Before Epoxy Coating





Pictured on this page is a completed Belzona epoxy coating job, from start to finish, on a York 250-ton condenser located in Los Angeles, CA. Click the photos to the right to expand them for more clarity.

The before pictures show the tubesheets and endbells before we started our work. Severe corrosion and rust 'nodules' mark the degradation of all affected surfaces, further eroding the steel components. Our technicians grit blasted all of this debris off of both surfaces so that clean metal is exposed, free from corrosion and rust. They then hand-mixed and applied the Belzona epoxy product to the all affected surfaces, without allowing any to enter the tubes. The coating is applied in two colors to ensure not only 100% coverage, but also proper thickness of the coating for its long-term durability. The coating keeps the tubes cleaner, and the condenser will perform more efficiently.

[Contact us](#) or call us at 800-356-1932 for more immediate attention, with the model of your equipment so that we can better assist you in the repairs of your condenser, evaporator, or heat exchanger.

Carrier 19XR chiller

[Hinges on a Carrier 19XR chiller](#)



These hinges were installed on a pair of new Carrier 19XR chillers to make life easy for servicing the condenser and cooler tubes. They are scheduled for our Belzona this winter.

Please provide us your name, phone number, email address, location of equipment, model and serial# of equipment that you want us to help you with. Please provide a brief description of what you need or problems you are having with your equipment.

Trane CVHF 1250

Trane CVHF 1250 condenser with damaged tubes, tube sheets and heads





Here are pictures of a Trane CVHF1250 condenser with damaged tubes, corroded tube sheets and heads. This unit was losing refrigerant and taking on air. We plugged off a few tubes for the customer, blasted off the rust and corrosion and Belzona coated everything to stop any future damage.

Please provide us your name, phone number, email address, location of equipment, model and serial# of equipment that you want us to help you with. Please provide a brief description of what you need or problems you are having with your equipment.

Trane CVHF 1050



Trane CVHF-1050 condenser with internal pitting. Cause, tower fill media stuck in tubes causing under deposit corrosion. Some of These tubes had to be plugged of to prevent failure.

Please provide us your name, phone number, email address, location of equipment, model and serial# of equipment that you want us to help you with. Please provide a brief description of what you need or problems you are having with your equipment.

Trane RTHB 250

[Finished Belzona Epoxy Coating on Tubesheet](#)



Pictured on this page is a completed Belzona epoxy coating job, from start to finish, on a Trane RTHB 250-ton condenser located in Denver, CO. Click the photos to the right to expand them for more clarity.

The before pictures show the tubesheets and endbells before we started our work. Severe corrosion and rust 'nodules' mark the degradation of all affected surfaces, which left to their devices, can begin to erode the seal between tubes and tubesheets and allow leaks from the O-ring gasket surface.

Our technicians grit blasted all of this debris off of both surfaces so that clean metal is exposed, free from corrosion and rust. They then hand-mixed and applied the Belzona epoxy product to the all

affected surfaces, without allowing any to enter the tubes. The coating is applied in two colors to ensure not only 100% coverage, but also proper thickness of the coating for its long-term durability. As a further measure, we eliminated the previous O-ring gasket area and installed new, full-face gaskets that allow two things: prevention of cracking on the new epoxy coating, and the ability to re-use the gasket two to three more times between changes.

[Contact us](#) or call us at 800-356-1932 for more immediate attention, with the model of your equipment so that we can better assist you in the repairs of your condenser, evaporator, or heat exchanger.

Belzona 1111 (Super Metal)

A 2-part repair composite for metal repair and resurfacing based on solvent free epoxy resin reinforced with silicon steel alloy. This repair material will not corrode and resists a wide range of chemicals. It is easy to mix and apply without the need of specialist tools and can be machined using conventional tools.

Key benefits:

- Multi-purpose durable repair composite
- Fully machinable using conventional tools
- Application and cure at room temperature - no hot work involved
- Simple mixing ratio
- Reduced health and safety risks as it is solvent free
- No shrinkage, expansion or distortion
- Excellent adhesion to metals including stainless steel, carbon steel, aluminium, brass and copper
- Will adhere to many other natural and synthetic materials including glass and wood
- Outstanding corrosion resistance
- Excellent chemical resistance against a wide range of chemicals
- Excellent electrical insulation characteristics

Applications for Belzona 1111 (Super Metal) include:

- Repair of cracks and holes on engine and pump casings, pipes, tanks and other equipment
- Resurface of pitted metal surfaces
- Repair of damaged shafts and hydraulic rams
- In situ flange repair
- High strength structural adhesive for metal bonding
- Creation of irregular load bearing shims and reforming of bearing housings

Belzona 1111 (Super Metal) is suitable for contact with potable water as it is certified to [NSF/ANSI Standard 61](#) and satisfies the UK Drinking Water Inspectorate requirements.

Key technical data:

Working life at 25°C (77°F)	15 minutes
Time to immersion service at 25°C (77°F)	20 hours
Pull off adhesion (D4541 / ISO 4624)	3,240 psi (22.33MPa) ambient cure on blasted mild steel
Compressive strength (ASTM D695)	12,900 psi (88.9MPa) ambient cure
Temperature resistance	93°C (200°F) immersed, 200°C (392°F) dry
Bonds to	Aluminium, copper, steel, stainless steel, cast iron, lead, glass, wood and many more
Typical applications	Bonding, shimming, filling, gluing, patch repairs and many more
Unit size	1kg, 2kg, 5kg. Pack sizes may vary locally

More information:

For more information about Belzona 1111 (Super Metal) [contact us](#) or find your [local distributor](#).

You can apply to join [Belzona Connect](#) to access additional information including MSDS and instructions for use.

Belzona 1311 (Ceramic R-Metal)

A 2-part epoxy-based repair composite designed for metal repair and protection against the effects of erosion and corrosion. This solvent free repair composite has excellent chemical resistance and will bond to all metals and most other rigid surfaces. It is easy to mix and apply without the need for specialist tools and it cures at room temperature eliminating the need for hot work. It is ideally suited to be overcoated with [Belzona 1321 \(Ceramic S-Metal\)](#) to ensure long lasting performance.

Belzona 1311 (Ceramic R-Metal) can also be used as a high strength structural adhesive for metal bonding and to create irregular load bearing shims.

Key benefits:

- Long-term erosion and corrosion resistance
- Excellent bonding to almost any rigid surface including steel, aluminium, copper, brass, glass, wood and most plastics
- Excellent chemical resistance against a wide range of chemicals
- Reduced health and safety risks as it is solvent free
- Simple mixing ratio
- Application and cure at room temperature - no hot work involved
- No shrinkage, expansion or distortion
- Excellent electrical insulation characteristics

Applications for Belzona 1311 (Ceramic R-Metal) include:

- Rebuilding and geometry reconstruction of centrifugal and positive displacement pumps damaged by erosion and corrosion
- Pit fill and resurface of heat exchangers, water boxes and tube sheets
- Repair of butterfly and gate valves, fans and kort nozzles deteriorated as a result of erosion, corrosion and cavitation
- Repair of pipe elbows damaged by impingement
- High strength structural adhesive for metal bonding
- Creation of irregular load bearing shims

Key technical data:

Working life at 25°C (77°F)	15 minutes
Time to mechanical cure at 25°C (77°F)	20 hours
Pull off adhesion (D4541 / ISO 4624)	3,000 psi (20.7 MPa) on grit blasted steel
Compressive strength (ASTM D695)	18,000 psi (124 MPa)
Temperature resistance	93°C (200°F) immersed, 200°C (392°F) dry

Bonds to	Aluminium, copper, brass, steel, stainless steel, cast iron, lead, glass, wood, most plastics and other rigid surfaces
Typical applications	Repair of erosion and corrosion damage, forming of detail parts, shimming and many more
Unit size	2kg. Pack sizes may vary locally.

More information:

For more information about Belzona 1311 (Ceramic R-Metal) [contact us](#) or find your [local distributor](#).

You can apply to join [Belzona Connect](#) to access additional information including MSDS and instructions for use.