



Micro-Nice® D-5 Frequently Asked Questions



Q: What is Micro-Nice® D-5 and how does it work?

A: 1) Micro-Nice® is a plant-based Phytochemical originally created in Thailand from which all Micro-Nice® products are produced. D-5 is a special Micro-Nice® formulation used to combat the extremely harsh scale and bio-mass/bio-film problems commonly found in Thailand and other Pacific - rim countries, as well as in many regions in North America. 2) D-5 uses a two pronged approach, it breaks the molecular bond between the contaminant, be it chemical or biological based, and the surface to which it is trying to adhere. At the same time D-5 is softening and breaking down the chemical or biological mass and turning it into precipitated sediment for easy removal through blow-downs, filtration or equipment sump cleanings. In a short time the water clarifies and blow-downs become less frequent, thereby saving water and expensive treatment chemicals.

Q: What types of scale does D-5 work on?

A: D-5 works on all known types of scale including the most popular types of scale such as Calcium Carbonate (CaCO_3), Magnesium Silicate (Mg_2SiO_4), Calcium Sulfate (CaSO_4), Iron Oxide (FeO), Calcium Phosphate ($\text{Ca}_3(\text{PO}_4)_2$), Analcite ($\text{NaAlSi}_2\text{O}_6 \cdot \text{H}_2\text{O}$), and others.

Q: I have been told bio-films can actually have more of an impact on thermal performance than that of scale. Is this true?

A: Yes, based on equal thicknesses of scale and bio-films. Bio-films have a thermal resistance factor many times greater than that of hard scales. Exactly how much depends on the type of hard scale used for comparison. One sixteenth inch of bio-film is roughly equivalent to one quarter inch of hard calcium carbonate scale. Both have a large impact on the thermal performance of cooling towers and condensers.

Q: Does D-5 work well with bio-film and bio-mass issues?

A: Yes, D-5 works exceptionally well on releasing the adhesion of both Bio-films and Bio-Mass in liquid thermal exchange systems and preventing further formation and adhesions with continued use. In a very short time, typically one to two weeks depending on system size and how badly the water was fouled, D-5 will clarify the water in systems with these problems by breaking the bond of these organisms to one another. Contaminants will be then be eliminated by blow-downs and sedimentation. This rapid clarification of the water is an indication of how quickly and how well D-5 solves such problems. In new equipment, if introduced at startup D-5 will prevent these biological organisms from adhering to all surfaces constantly wetted with D-5 in the water.

Q: How safe is D-5 compared to traditional scale treatments?

A: Extremely safe both from a user standpoint and an environmental standpoint. Micro-Nice® D-5 is considered non-acid, contains no metals, phosphates or nitrogen compounds. Micro-Nice® D-5 is non-toxic and non-corrosive. D-5 has been FDA accepted for use in dairy plant heat exchanger systems.

Q: I have heard that environmental regulations for areas such as the Chesapeake Bay Watershed will soon be tightened on products containing Phosphates, Metals and Nitrogen compounds. Does D-5 already meet the proposed requirements?

A: Yes, we believe from what we have gathered so far on these future regulations that D-5 in its current formulation is already compliant to the new stricter standards.

Q: We outsource our heating and cooling system water treatment to a third party water treatment company, but after seeing your product we began personally looking at our equipment for the first time in quite a while, and have discovered that we still have problems in spite of their ongoing treatments. We need to get these problems solved. We want to try using your D-5 product. Won't the water treatment company object to us introducing your product into our existing chemical treatment regimen?

A: 1) We are not surprised to hear that you typically do not see your own towers and equipment very often with a treatment company taking care of them for you. This is increasingly common with busy facilities, tight budgets and busy plant personnel. Those are reasons water treatment is often outsourced. We recommend all facilities make it a point to physically look at the interior condition of their cooling towers, heat exchangers and other equipment first-hand. We strongly encourage companies to get more involved in understanding how well their current treatment regimens are really working, based on what we are seeing in the industry. 2) Your treatment company rep may initially see us as a competitive threat, or they may try to dismiss D-5 altogether as being a "snake oil remedy." Neither of these is true. We are here to help with issues which are difficult or perhaps impossible for water treatment companies to treat



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without the use of harsh and potentially dangerous chemicals. In many cases even with harsh chemicals, traditional treatment companies cannot solve these issues, and could potentially damage the equipment:



Cooling System Tube Bundles Ruined by Improper Acid Treatments

Micro-Nice® D-5 is extremely safe and has proven to be incredibly effective without the associated risks of potentially hazardous chemicals to personnel, equipment or the environment. You have to remember it is your personnel, your equipment, your facility and your budget which are being affected, and you have the right to insist your treatment rep cooperates with the introduction and trial of D-5. A sincere, knowledgeable treatment rep should admit to the limitations of his own product line and look out for your best interests by adding D-5 to your treatment program whenever it is applicable. If you wish we will be more than pleased to speak directly with your current treatment company representative and work with them to your benefit and theirs. We currently communicate on varying levels with at least 3 of the nations Top 10 industrial water treatment providers.

Q: Will D-5 replace all our current water treatment chemicals such as the biocide and the corrosion inhibitor? If not is D-5 compatible with those other water treatments?

A: 1) No, Micro-Nice® D-5, being non-toxic, environmentally friendly and biodegradable was never intended to replace biocides in these systems. We recommend you continue your water treatment program biocides. As for corrosion prevention, we do not claim D-5 is a corrosion inhibitor, although it will reduce the chances for what is called under-scale and under-organism corrosion due to the fact that if these contaminants cannot adhere, there is no longer an opportunity for these types of corrosion to occur. We recommend that you also continue with your current corrosion inhibitors.

2) As for compatibility, Micro-Nice® D-5 is what is known as a non-reactive product, meaning none of D-5's ingredients should react with any other known chemicals commonly used in tower and boiler treatment programs.

Q: Our upper decision makers are not necessarily educated in water treatment and equipment issues and may simply feel D-5 is an added cost or one more thing they do not wish to fund or deal with. It can also be difficult with our current purchasing structure to introduce a new item or new vendor no matter how good the product works or what the benefits will be. Do we have to purchase D-5 directly from you as an individual item, or can we purchase it through our water treatment company?

A: The choice is yours. We can provide D-5 directly to you or we can provide it to your treatment company who can build it directly into the cost of your treatment regimen. Either way we can direct ship the product to your docks or your treatment company's location.

Q: Our engineers are considering simply expanding our reverse osmosis water treatment system to include our tower makeup water. This is supposed to give us pure water for use in our heating and cooling systems. They feel we can eliminate the need for most of our water treatment chemicals which is a considerable expense for a big plant like ours. Does this sound like a good idea?

A: No, absolutely not based on what we have been told by industry experts, for the following reasons:

Unless you have very small system capacities and makeup water needs or a very large RO system, it not practical to use RO water due to the speed at which most RO systems produce purified water. Placing the added burden of providing water for thermal exchange systems on your RO process does not seem like a practical application of RO technology. More importantly, while RO does have very legitimate uses for plant process system water, it is not



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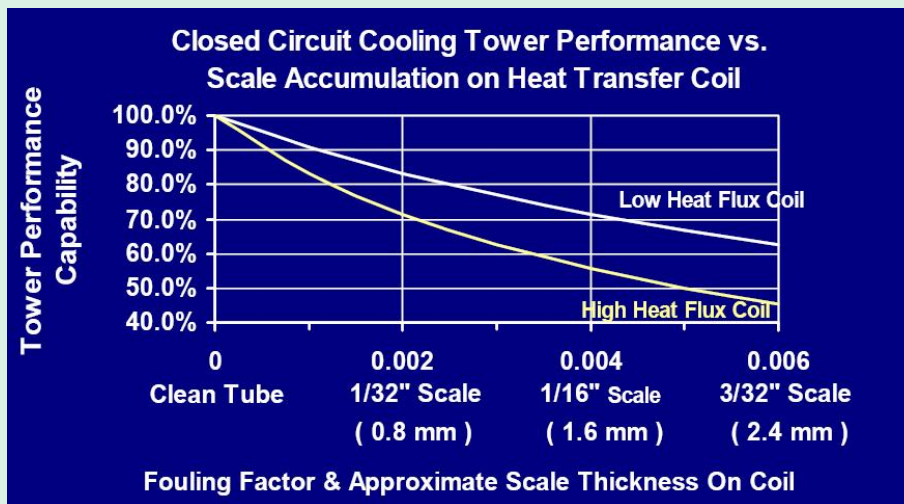


necessarily a good idea to introduce RO water into your tower water systems. Water naturally contains chemicals/elements which act as corrosion buffers. The RO process removes these, essentially making your water more corrosive to the components in your towers, heat exchangers and condensers. Many times industrial RO water is used in piping systems and equipment made of stainless steel and other corrosion resistant materials which can stand up to the effects of RO water. Tower and exchanger systems often contain brass, copper and aluminum all of which can be subject to corrosion. Even the galvanized metals of today's towers are more susceptible to corrosion than their very heavily galvanized ancestors due to environmental regulations on zinc and other elements of the galvanized coating in the cooling water stream. The same risk is present in using softened water in cooling & heating systems. While you might partially control hardness and scale, you may damage your equipment by removing the naturally occurring buffers with your softeners. You may have to increase your corrosion inhibitors, and you will then have the added costs of softening and increased corrosion inhibitor costs. We would recommend consulting with an experienced, qualified independent third party outside of the entity who is recommending softening or RO before using such treated water in these systems.

Q: We have scale and bio-slime issues with our equipment. Will solving this problem with your D-5 product help us save energy? How much energy? Will D-5 pay for itself through these savings?

A: 1) Yes, ridding your equipment of scale and bio-slimes/bio-masses will definitely save you energy, and can increase plant process performances.

2) The exact amount of energy is dependant on many factors; the amount of bio-slime buildup, varying or steady state loads on your connected plant equipment, entering wet bulb air temperatures, entering and leaving water temperatures, system pressures, dew points and so forth at any given time. Determining the precise amount of energy saved in interconnected systems requires multiple data gathering points and very complex data gathering. Manufacturers of your equipment and organizations such as the Cooling Tower Institute, and even some of the water treatment companies publish tables stating the effects of scale and bio-films on thermal performance of equipment. For example, the following graph is published by the Cooling Technology Institute:



3) Micro-Nice® D-5 most definitely helps to pay for a good portion of it's own costs from energy saved through increased efficiencies in cooling and heating equipment thermal performance and therefore through increases in plant process efficiency. Added to these savings are reductions in make-up water usage and a reduced need for manual equipment cleaning. Many of the plants we are in are continually doing simultaneous upgrades to various pieces of equipment. This can make it difficult to pin-point energy savings as being strictly from D-5. We prefer the simple "scale vs. performance" comparison method as stated by various equipment manufacturer's and trade organizations.

Q: Every spring in spite of having what we feel is a pretty competent water treatment company onboard, we spend an enormous amount of time and money to manually descale and clean our towers and equipment. This is often following a round of expensive, potentially damaging and what appears to be fruitless concentrated chemical descaling by the treatment company. So far in our experience with more than one of these companies we have never been able to get our towers completely scale free during this clean-up period. Can your product help us get the towers clean and keep them that way, or will we still need to perform this huge effort every year anyway?



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A: In one of our larger applications, the user's situation is nearly identical to what you describe. When we introduced them to Micro-Nice® D-5 they were on their second major chemical treatment company in a six year period and to our knowledge had also never been able to completely clean their towers during their spring cleanup, even after their very first year of operation.

Once the scale built up on their systems, it appears that subsequent acid chemical treatments coupled with the heat from their processes may have actually caused the scale to form a "Super Scale" of sorts similar to the effect of letting concrete harden on clean roughened steel and then baking it on. Once this happened no *traditional* chemical treatments were going to help, even with their second treatment company being a highly capable company with, in this case an individual whom we feel is outstanding in the water care industry being responsible for this plant. In less than 60 days of D-5 use the towers were ready for the spring cleaning and long before that it was evident D-5 was already removing the scale merely through the washing actions of the tower nozzles. They were able to completely clean their towers of scale to what we would call a 99% clean condition, and subsequent D-5 use at a lower concentration has continued to improve their conditions to the point where we can comfortably say they are as close to 100% cleanliness as possible, short of installing new equipment.

2) This plant may continue to perform spring maintenance on their towers to do an in-depth examination of belts, fasteners, seals, pumps and drive motors but will not need to include power washing or anything scale or film related as part of that cleaning other than perhaps suctioning and rinsing the individual tower sumps. This will have a major positive impact on their O&M costs related to the towers, and D-5 most certainly can take credit for that. This on top of the energy savings is how Micro-Nice® D-5 pays for itself.

It is important to note that D-5 not only acts on the parts of the systems we normally think of or which we can view easily, it is performing the same functions throughout the system, reducing and eliminating scale in piping, pumps, heat exchangers and other accessories, thereby increasing flow through reduced friction losses and lessening the chances of under scale corrosion on the interior surfaces of piping and equipment.

Q: We are considering adding side stream filtration to our cooling tower and heat exchanger loop. Is D-5 compatible with filtration systems?

A: D-5 is compatible with and unaffected by all cartridge, strainer and media filtration methods.

Q: How do I know how much D-5 to use?

A: The D-5 concentration is based on three factors depending on whether we are helping you clean up an existing system or if you are commissioning a brand new system. 1) In the cleanup phase we recommend D-5 at 250PPM based on total system volume for 45-90 days, depending on the severity of the scale. 2) Then we reduce that amount to 50 to 100PPM continuously for the life of the system, depending largely on makeup water chemistry. 3) In brand new systems, unless you have extremely tough water or other extreme conditions, a D-5 concentration of 50PPM on a continual basis will help maintain your system(s) free from scale and bio-film/bio-mass, thereby helping to keep them performing at peak thermal efficiency.

Q: How do I introduce D-5 into my system?

A: D-5 can be fed in a variety of ways. 1) In small, simple systems it can be what is known as slug-fed, which means simply dumping the required amount into the system on a daily basis in one treatment. 2) In larger more complicated systems or those which are not easily accessible (i.e. rooftop mounted) D-5 can be fed into the system through injection into a common sump or system piping with the use of a dedicated chemical feeder pump. These pumps can be triggered by a couple of simple methods 1) Slaving to other chemical feed pump circuits, then the D-5 pump is easily calibrated to achieve the desired injection amount. 2) Triggered by a simple water meter on the equipment make-up water line which sends a pulsed signal to the pump. Both of these options are fairly easy to set-up and calibrate. If you currently use a water treatment company or in-house maintenance technicians this should certainly be within their abilities. We can assist you with pump and/or water meter selection and locating an equipment provider for these items.

Q: Do you have local support for D-5 in my area?

A: We will check for you. We have representation in some parts of the country and are currently adding reps around the nation when we find acceptable firms to represent or distribute D-5. The implementation of Micro-Nice® D-5 is quite simple. We can easily assist you through the process from our headquarters location or put you in touch with one of our existing representatives who can assist you.