A product formulated to shield and protect finned cooling and heating coils.

- A food grade product, made with FDA approved ingredients.
- Ready-to-use formulation.
- Forms protective shield on coils.
- Reduces ability of dirt and grime to adhere to coil.
- Makes next cleaning easier.
- Extends life of coils operating in corrosive environments like salt air and food acids.
- Enables coil to perform at designed efficiency.

Coil Cleaners

Cal-Shield®



Description

Cal-Shield is a synergistic liquid specifically designed for application on air-cooled condensers, evaporator coils and other finned heating and cooling coils where it forms a micro-thin or molecular film. Once applied, Cal-Shield will shield and protect the coil from adverse conditions within the operating environment.

Application

Finned heat transfer coils like air-cooled condensers, evaporator coils, chiller coils and other similar air conditioning, refrigeration equipment are specifically designed to facilitate heat transfer between the coolant such as refrigerant or chilled water and ambient air. Conditions within the ambient air or environment such as greasy dirt and grime, nicotine, humidity, or corrosive salt air can affect the coil, causing the formation of efficiency-robbing deposits or even the degradation of the coil. These developments in turn result in a loss of capacity and efficiency and a corresponding increase in power costs.

For example, it is a typically accepted rule that a 2ºF increase in condensing temperature brought on by the coil being fouled with greasy dirt and grim, results in a corresponding 1% increase in power costs and a 1% loss in capacity. Traditional cleaning of the coil with a coil cleaner removes most to all of these deposits, restoring lost capacity as well as operating efficiencies. Unfortunately, as the industry knows too well, the problem will return and cleaning will again be required.

Use of Cal-Shield will allow the coil to operate for longer periods between cleaning. Once Cal-Shield is applied to the cleaned coil, it forms a protective shield that helps the coil resist the depositing of dirt and grime so that moisture will “bead up” and run off. This enables the coil to perform more efficiently for a longer period of time. And, where coils are installed in aggressive environments such as salt air and food coolers, Cal-Shield will extend the coil’s service life in this corrosive environment.

Packaging

1 gallon	**4148-08**
1 quart	**4148-32**

How much Cal-Shield to use

From a technical stand point, good oil and grease repellency is normally achieved with an application of less than one pint of Cal-Shield per 1000 square feet. In turn this means that one gallon can provide adequate protection for over 8000 square feet. However, this is a technical expression of usage, and it doesn’t always agree with real applications.

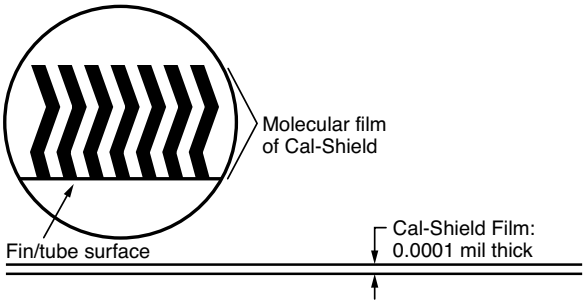
Obviously, it is inconceivable and impractical to determine the square footage of all the fins on a given coil. In addition, proper application of Cal-Shield to all surfaces and crevices will ultimately result in some over-spray or excess usage. Moreover, characteristics of the sprayer as well as the techniques used by the service technician will also effect usage. Consequently, from practical experience, it is impossible to accurately predict how much will be used although it is expected that one gallon of Cal-Shield will adequately treat up to three to four 4 ton coils. Degree of pre-cleaning and other on-site conditions can influence just how much product will be used, and usage rates below as well as above “one gallon per three to four 4-ton coils” could be encountered. Application with a pump-up, sprayer, using a smooth back-and-forth spraying action (like that used for painting) will optimize product usage.

It is also recommended that the sprayer used be dedicated to Cal-Shield in order to avoid the effect other chemicals might have. If this is not possible, thoroughly flush and rinse the sprayer clean of other chemicals prior to using it to apply Cal-Shield.

How Does Cal-Shield Work?

The active ingredient in Cal-Shield is the surface protector, and its chemistry can be generally described as one of a long chain molecule. One end of the molecule is phosphate, and this is the part that adheres to the metal surface. The other end is the fluorine and carbon fluoro-chemical that repels greasy dirt and grime as well as moisture.

Figure 1 below depicts how the Cal-Shield surface protector forms.



Fin or Tube Surface

FIGURE 1

As applied, Cal-Shield provides a shield or coating with very low surface tension, or surface energy. As a result, greasy, oily dirt and grime or water, compounds that have higher surface tension or energy, are repelled or not permitted to adhere. For example, the surface tension of a fluoro-chemical like Cal-Shield is 13-17 dynes/cm^2 while for greasy, oily soil it is 23 dynes/cm^2 and for water it is 73 dynes/cm^2. Because these compounds have higher surface tension or energies, they are repelled. Figure 2 depicts this activity, showing how a treated surface repels these compounds and/or makes them easier to flush or clean away.

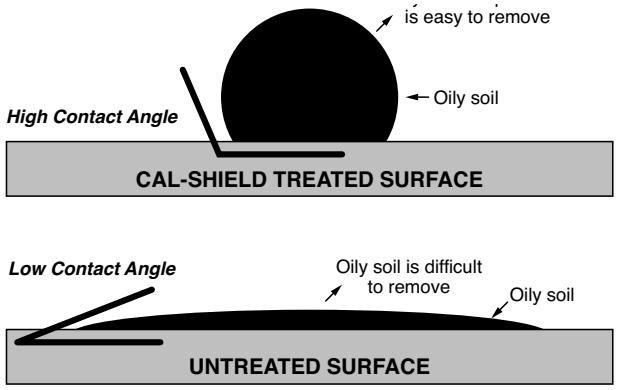


FIGURE 2

What About Heat Transfer?

The question of "effect on heat transfer" of any product applied to a coil is a bonafide concern. But, in the case of Cal-Shield, the product's application results in a molecular film that has absolutely no impact on the equipment's heat transfer. The resultant film of is 50-100 angstroms in thickness, or approximately 0.0001 mil; one mil alone is equal to one thousandth of an inch, and we're looking at 0.0001 mil or one-ten thousandth of a mil! This is the thickness of one molecule, and it does not effect heat transfer.

Food Grade Status

Cal-Shield conforms to FDA regulations for use in direct contact with nonalcoholic foods. It is listed in the Code of Federal Regulations, Food and Drugs, 21 CFR 176.170, which covers components of paper and paperboard that come into contact with aqueous and fatty foods. And although the Cal-Shield product will not (and should not) be used in such an application, the implication is that Cal-Shield is a very safe product to use, particularly on coils like fan coil units in walk-in coolers. In such applications, it would be recommended that the foods be removed from the area, which would be done in any case prior to the cleaning of the coil.

Corrosion Protection

Because of its ability to form a thin molecular film, a film having very low surface tension, Cal-Shield can also provide protection against the corrosive forces of salt air as well as food acids in refrigerated food coolers. To confirm and prove this benefit, an experiment was set up involving samples of aluminum fins. The samples were cleaned and half were treated with Cal-Shield while half were not.

Both treated and untreated fins were suspended over containers of orange juice in an attempt to bring them into contact with the food product's vapors, which would contain citric acid. This was conducted in a confined space for 3 months at 50°F. The objective was to expose both treated and untreated aluminum to two forces of aggressive food acids.

The photographs in Figure 3 reveal remarkable differences. As you can see, the untreated aluminum fins show significant localized corrosion or surface pitting. However, the fins treated with Cal-Shield look clean and protected. Cal-Shield has inhibited or prevented corrosion due to food acids.

Untreated Fins:

Significant surface pitting (localized corrosion)



Cal-Shield Treated Fins:

No visible surface pitting

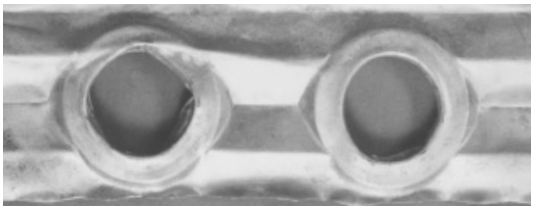


FIGURE 3

Dedicated Sprayer

Use the Cal-Shield Sprayer as a dedicated application tool for applying the Cal-Shield. This will provide for a constant source of Cal-Shield for use after every coil cleaning job. The sprayer is constructed of high-density polyethylene. It has a funnel top which provides for easy pouring and has a one gallon working capacity. It comes with a 10" polypropylene pump, brass handle and extension tube with adjustable nozzle, a wear-resistant hose and a pressure relief valve.

Part Number 4770-2

Directions for Use

Cal-Shield is easy to use. Since it is ready-to-use, no mixing is required and can be sprayed directly onto a cleaned coil.

1. First, it is necessary to clean finned heating and cooling coils with an approved coil cleaner, such as Nu-Calgon's Cal-Brite, Nu-Brite, Foam-Brite, or Alka-Brite. These cleaners are described as "approved" because they will properly prepare the coil for the application of Cal-Shield.
2. After a complete cleaning to remove all dirt and grime from the coils, rinse thoroughly with water to remove all cleaner and to stop the cleaning action.
3. Once cleaned in this manner, simply spray the wet finned coils with Cal-Shield, using a gentle back and forth action similar to that used for spray painting. Note that the coils do not have to be dry in order for Cal-Shield to be applied.
4. Once applied, Cal-Shield's protective coating will inhibit or deter the dirt and grime from adhering. Water will actually bead-up and sheet off the treated fins rather than remain with its impurities, as the case with untreated fins, enabling the coil to stay cleaner longer and to operate at design efficiency.
5. As in the case with handling coil cleaners, always use personal protective equipment such as gloves and goggles.