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| Document Type / Category | Instructions For Use (IFU) |
| Document Number, Issue, Title | IFU 042 Rev01 Coil & Surface Cleaner New Coils |

All Aeris Environmental personnel, sub-contractors and certified applicators are expected to take an active role in establishing, implementing and maintaining this Procedure in line with this IFU according to their role and responsibility.

1. PURPOSE

The purpose of acting in accordance with this IFU is to have an uninterrupted, optimal process ensuring the correct procedure is followed with respect to the use of the products. This IFU shall also be part of Aeris' continuous improvement initiative.

This Degreasing Procedure outlines the process required to effectively clean by degreasing the surfaces of newly manufactured Heat Exchange Coils in preparation for coating.

This provides the following outcomes:

- **Clean heat-exchange coils prepared for the application of Aeris Corrosion Protection.**

EFFECTIVE DEGREASING

During production stages HVAC elements (aluminium fins, copper tubing & piping, housing etc.) are exposed to different stamping and processing lubricating oils used to facilitate the coil manufacturing and assembling process.

Oil and lubricant films on the metallic surfaces are often invisible and due to their strong affinity to metal surfaces are extremely difficult to remove. Despite the fact that HVAC manufacturers make an effort to remove these lubricants by evaporation or washing (putting assembled coils into ovens to evaporate oils and/or by washing them in aqueous detergents also known as a degreasing process), there is no appropriate validation of the efficacy of the process being employed. Often, in the best-case scenario, only a portion of the lubricant is removed, leaving residual oil that severely compromises the quality and integrity of the subsequent coating. These compromised coatings are most often manifested by multiple surface defects and a patchy appearance of the coated surfaces.

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The removal and solubilisation of lubricating oils from inner surfaces between narrow thin spaces and fin collars, as well from the associated tubing, is necessary and represents the most challenging aspect of the degreasing process.

Aeris Environmental offers a cost effective, environmentally friendly, biodegradable degreasing concentrate which has been specifically formulated to address the substantial challenges of removing a variety of common stamping lubricants and processing oils from aluminium, copper, and galvanised steel surfaces.

The product is available in a concentrated form (to be diluted with potable water to the concentration range of 5.0%-10.0% by the end user).

2. PROCEDURE DESCRIPTION AND PROCESS WORK FLOW

2a. Coil Degreasing

The Degreasing procedure should be conducted in accordance with Aeris Environmental Recommendations. This process includes steps for the degreasing of New Heat Exchange Coils.

The steps in this procedure are as follows:

- 1. Preparation**
 - a. Product Handling & Packaging**
 - b. Apparatus & Equipment Required**
 - c. Product Dilution and Application Rates**
 - d. PPE and OH&S Requirements**
- 2. Setup**
- 3. Coil Degreasing Process**
- 4. Clean up Process**

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PROCEDURE

1. Preparation

a. Product Handling & Packaging

Applicators should consult the product Safety Data Sheet (SDS) prior to use and handling.

AerisGUARD Coil & Surface Cleaner requires dilution. A 5.0-10.0% solution should be used for coils and 50% for end plates and copper U bends.

This product is available in 5L, 20L & 200L units.

The product has a shelf life of two years from the date of manufacture.

Always store the product out of direct sunlight and not exposed to hot environments for extended periods of time.

b. Apparatus & Equipment Required

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| Water pressure washer | Extra hose and fittings |
| Residual Current Device (RCD) | Mop, bucket, Wet Vac |
| Pressure pump, Ladder | Tape, rope, G Clamps |
| Plastic Sheeting/Tarpaulin | Mixing Cup, jug, Dilution Mixer |
| Necessary PPE | Paint brush |

c. Product Dilution and Application Rates

AerisGUARD Coil & Surface Cleaner requires dilution.

- **For Coils & Surfaces:** A 5.0-10.0% solution in potable water should be used e.g. 50 – 100 mls of concentrate per 1 litre of water/6.4 - 12.8 fl.oz. per 1 gallon of water (5 – 10 litres of concentrate per 100 litres of water/5 - 10 gallons of concentrate per 100 gallons of water)
- **For End Plates and Copper U Bends:** A 50% solution should be used e.g. 500ml Concentrate mixed with 500ml/0.5 gal of concentrate mixed with 0.5 gal of water.

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The application rate of the cleaning / preparation solution is –

- **COIL - 5L of diluted solution (250-500ml Concentrate) per square metre of Coil face (based on 12 fins/inch and 100mm depth) / 15.7 fl. oz of diluted solution (0.79-1.57fl. oz Concentrate) per square foot of Coil face (based on 12 fins/inch and 4 inches depth). The amount of solution used is scaled according to the above rate of usage. This is applied evenly at the rate of 2.5 L/sqm(7.86 fl. Oz/sqf) on each side of the coil. It is important that the degreasing process takes place on both sides of the coil and that the degreasing solution penetrates into the coil covering all surfaces.**
- **For a FLAT METALLIC SURFACE, the diluted solution (150-300ml/0.47-0.94 fl. oz Concentrate) is used at the rate of 3L per m², (1.5 L per m² from each side of the surface)/9.42 fl. oz per square foot, (4.71 fl. oz per square foot from each side of the surface).**

d. **PPE and OH&S Requirements**

- Waterproof Gloves (*e.g. high-density rubber*)
- full or half face masks. These can be fitted with filters rated for pesticides and solvents, (P2) or safety goggles (*Wraparound Clear are recommended*)
- full body suit with hood which may be waterproof (*Disposable suit is recommended to keep clean*)
- safety boots should be worn.

N.B. Other safety equipment may be required. OH&S requirements can vary geographically or by project nature.

2. **Setup**

- Ensure that equipment being used is protected by a (RCD) Residual Current Device to protect the user from electrical shock.
- Ensure Equipment being used is in good working order.
- Depending upon the mode of application other parts of the system (if coil has been installed) may need to be covered, e.g. fan motor and sensors located near the area to be cleaned.
- Ensure that the hoses for the pressure cleaner are all attached securely to avoid any excess water.
- A Wet Vac should be available in case it is needed.

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3. Coil Degreasing Process

Personal safety equipment should be worn for the remainder of the procedure.

Ensure that AerisGUARD Coil & Surface Cleaner has been diluted at the rate of 5.0-10.0%.

PRE-CLEANING OF COPPER TUBING AND COIL SURROUNDS

- Copper tubing & piping may be heavily contaminated with oils during their processing.
- If heavily contaminated with oil it is recommended that an additional manual pre-clean of copper tubing and housing areas is performed by brushing them with AerisGUARD Coil & Surface Cleaner (at 50% dilution) to effectively remove from oils and lubricants.
- After manual brushing coils should then undergo the normal degreasing process.

DEGREASING

- Dilute AerisGUARD Coil & Surface Cleaner at least 20:1 (5% solution) or as suggested in section 1 c above with potable water and ensure thorough mixing prior to degreasing. If possible use heated degreaser solution at least at 40°C (104°F).
- Use a "wet" spray nozzle for the spray gun to minimise atomisation and irritation to the eyes and respiratory passages.
- As above, if possible heat diluted degreasing solution to 40°C / 104°F before spraying.
- Coat thoroughly from each side of the coil and leave on for 15 minutes to ensure thorough removal of all lubrication oils.
- If using a pressure washer use the diluted solution through venturi / feeder tube spraying all coil surface and be sure to spray the end plate / copper bends.
- Pay particular attention to coil fin edges to avoid any damage such as folding.

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Rinsing

After degreasing all components must be rinsed with water.

- Rinse with a hose or pressure washer with **clean, potable water** to ensure thorough removal of all degreaser.
- High pressure washing can be used to remove residual degreasing surfactant taking care to avoid damage to fin edges, however, to avoid foaming, it is preferable to start washing with low pressure water.
- If at all possible the final rinse of coil is preferably completed with demineralised or RO water (to avoid any salt deposits being left on coil surfaces).
- The rinsing apparatus should be held at an angle of 45° diagonally down the coil and should be kept at this angle while cleaning the face of the coils
- Each coil should be cleaned from right to left and left to right at 45° angle so as the inner edge of the fin surface is cleaned.
- This process should continue until all foaming has stopped.

- Allow the degreased coil to dry thoroughly prior to coating. Air flow can be used to accelerate drying. No visible water droplets should be observed.
- If possible the unit can be placed in the sun to assist with drying.

- ALL SURFACES SHOULD BE COMPLETELY CLEANED BEFORE APPLICATION OF CORROSION PROTECTION.
- ALL SURFACES MUST BE ALLOWED TO COMPLETELY DRY BEFORE APPLYING CORROSION PROTECTION COATING.

4. Clean Up Process

- Ensure that all equipment is cleaned as soon as possible after use.
- Mop up all excess water
- Remove and dispose of all empty product containers.
- Clean any spilt coating before it dries.

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