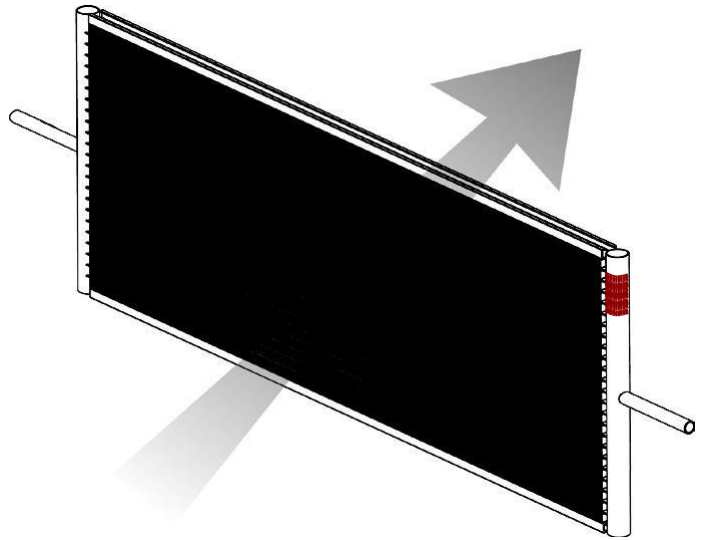


Installation and Maintenance Manual



Micro Channel Aluminium Condenser

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It is prohibited to pass on this documentation or parts thereof to unauthorized third parties.

Following reference documents supports this Installation Manual:

- Aluventa General Terms and Condition of Sale and Delivery of Aluventa A/S
- Aluventa Specification
- Aluventa Selection Guideline

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1 Symbols

1.1 Warning notices

Classification of warning notices

There are three types of warning notices indicated by the following signal words depending on the type of danger:

- **Caution** warns about the risk of damage to property.
- **Warning** warns about the risk of physical injury.
- **Danger** warns about the risk of fatal injury.

Structure of warning notices



Signal word

Type and source of danger

⇒ Action to avoid the danger.

1.2 Other symbols

Instructions

Structure of instructions:

⇒ Instruction to do something.

Result of the action, if necessary.

Lists

Structure of bulleted lists:

- List level 1
 - List level 2

Structure of numbered lists:

1. List level 1
2. List level 1
 - 2.1. List level 2
 - 2.2. List level 2

2 Safety and dangers

2.1 Safety instructions

The installation and operating manual includes the general safety rules for condensers that are most important for the operator. For further safety instructions, Aluventa refers to the national regulations for the operation of refrigeration units.

- ⇒ Make sure that condenser is operated exclusively by qualified personnel.
- ⇒ Point out dangers coming from refrigerants to operating personnel.
- ⇒ Observe general and local regulations for handling refrigerants.
- ⇒ Provide a sufficient number of suitable and serviceable fire-extinguishing equipment.
- ⇒ Use exclusively approved materials.
- ⇒ Use condenser in its original condition without unauthorised modifications and in proper technical condition.
- ⇒ Use original spare parts exclusively.
- ⇒ Any incorrect handling or use and unauthorised modifications of the condenser will terminate the warranty.
- ⇒ The condenser is usually filled with protective gas. Let out the gas by venting the condenser before opening the connecting pipe.
- ⇒ Use only coatings exclusively supplied by Aluventa.



Warning

Risk of injury by sharp edges!

For any works on condenser:

- ⇒ Wear protective gloves.



Warning

Risk of burns due to hot parts!

For any works on condenser:

- ⇒ Wear protective gloves.
- ⇒ Do not touch hot parts (e.g. pipes).



Warning

Damage due to high pressure!

Prior to any maintenance or repair works:

- ⇒ Make sure that condenser is pressureless.



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2.2 Safe handling

Instruction

- ⇒ Train the personnel handling the condenser on the following regularly, at least once a year:
 - Risks when handling condenser
 - Safety regulations
 - What to do in case of accidents and malfunctions
 - Measures to take in case of accidents and malfunctions

Personal protective equipment

The operator's responsibilities:

- ⇒ Provide personal protective equipment against coolants and refrigerants.
- ⇒ Keep personal protective equipment easily accessible and ready for use outside of dangerous areas.

Personal protective equipment consists of:

- protective leather gloves,
- eye protection (chemistry goggles)

Observe, among others, the following regulations in case of leaking refrigerant:

- ⇒ Keep first aid equipment ready.
- ⇒ Keep emergency shower ready.
- ⇒ Wear additional ambient air-independent respirator.

Damage control in case of leaking refrigerant



Warning

Risk of frost injuries!

- ⇒ Never touch liquid refrigerant.
- ⇒ Never spray water into or onto liquid refrigerant.
- ⇒ Make sure that refrigerant does not come into contact with eyes.
- ⇒ Wear gloves and protective goggles.

In case of refrigerant leaking:

- ⇒ Make sure that all persons leave the dangerous area immediately.
- ⇒ Observe first aid measures for refrigerant (see safety data sheet for refrigerant).
- ⇒ Call local fire brigade.
- ⇒ Enter the rooms contaminated with refrigerant exclusively wearing suitable protective clothing.
- ⇒ Air the rooms contaminated with refrigerant.

If the refrigerant concentration is above 0.25 kg/m³:

- ⇒ Wear ambient air-independent respirator.
- ⇒ Make sure that at least one other person wearing the required protective clothing is available for emergencies.

If possible without increasing the danger:

- ⇒ Close valve to condenser.

If liquid refrigerant is leaking:

- ⇒ Observe safety data sheet for refrigerant.

Limitation of damage in case of leaking coolants

In case of coolant leaking:

- ⇒ Make sure that the coolant does not get into the ground, the sewage water, or any buildings or installations.

Ecologically safe handling of refrigerants

- ⇒ Observe notes on handling and storing of refrigerants (see safety data sheet for refrigerant).
- ⇒ Make sure that the refrigerant does not get into the air, the ground or the sewage system.
- ⇒ Observe the refrigerant's water hazard class and take appropriate measures.

Ecologically safe handling of coolants

- ⇒ Observe notes on handling of coolant (see safety data sheet for coolant).
- ⇒ Observe the coolant's water hazard class and take appropriate measures.

3 Standards and laws

Note

Due to the large number of application possibilities and differing local regulations, information on standards and laws the condenser complies with will be provided in separate documents. Please contact the Aluventa application center.

4 Function

4.1 Intended use

- ⇒ Use condenser exclusively for condensing refrigerants or as a gas cooler or gas desuperheater by transferring heat to the ambient air.
- ⇒ Run condenser exclusively under the conditions specified by Aluventa.
- ⇒ Condenser is not intended for use in combination with water spraying.
- ⇒ Have modifications authorized by Aluventa.
- ⇒ Use condenser exclusively for installation in a system.
- ⇒ Use condenser exclusively at one pressure component with same pressure level in all compartments of the condenser.
- ⇒ Use condenser exclusively with the following refrigerants:
 - Refrigerants of the L1/A1 group according to EN378-1:200/2000. Approval of other refrigerants (NH₃, CO₂, HC) on enquiry. Additional safety regulations apply in this case and Aluventa recommend to use coating for these refrigerants.

Note

The condenser is an incomplete component part for installation within a refrigeration circuit.



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5 Installation

⇒ Have mounting system for condenser checked beforehand by Aluventa application center.

5.1 Storage and transport



Danger

Risk of fatal injury by component parts falling off!

- ⇒ Observe national and regional safety, storage and transport regulations.
 - ⇒ Make sure that the hoisting devices' capacity is sufficient.
 - ⇒ Make sure that the operating personnel are qualified for correct unloading and storage.
-



Warning

Damage due to incorrect storage and transport!

- ⇒ During storage and transport, protect condenser and packaging from:
 - metal dust/particle deposits
 - deposits of aluminium-corrosive materials
 - deposits of aluminium-corrosive liquids
 - deposits of aluminium-corrosive substances
 - mechanical damages
- ⇒ Transport condenser exclusively using a frame or holders.
- ⇒ Never lift condenser by pipe connections.
- ⇒ Protect condenser against hard shocks and collisions as well as against shifting during transport.
- ⇒ Store and transport condenser packed and dry.

When using lifting devices for transport:

- ⇒ Use edge protectors.
-



Warning

Damage due to dirt and corrosion!

- ⇒ Protect condenser from:
 - metal dust/particle deposits
 - deposits of aluminium-corrosive materials
 - deposits of aluminium-corrosive liquids
 - deposits of aluminium-corrosive substances
 - mechanical damages
 - ⇒ Install condenser immediately after opening the packaging.
-

Upon delivery:

- ⇒ Check items delivered for completeness.
 - ⇒ Check packaging and condenser for transport damage.
 - ⇒ Check if data on nameplate is correct and make sure that the nameplate is securely placed on the condenser.
-

In case of transport damage or missing parts:

- ⇒ Inform the transport company about any transport damage or missing parts immediately upon delivery and have them confirmed in writing in the charging documents.
- ⇒ Inform Aluventa in writing immediately.

5.2 Installation and notes on setup



Warning

Damage due to improper installation!

- ⇒ Fixate condenser exclusively in the places intended for this purpose.
 - ⇒ Never fixate condenser on pipe connections.
 - ⇒ Choose suitable installation method depending on size and weight of condenser.
 - ⇒ Observe thermal expansion of condenser.
 - ⇒ Create possibilities for expansion for condenser and connecting pipes.
-

- ⇒ Observe national mounting requirements.
- ⇒ Observe national safety regulations.
- ⇒ Protect condenser from:
 - immediate strong heat radiation
 - sparks
 - strong or long-lasting vibrations
 - mechanical stress
 - metal dust/particle deposits
 - deposits of aluminium-corrosive materials
 - deposits of aluminium-corrosive liquids
 - deposits of aluminium-corrosive substances
- ⇒ Ensure unobstructed flow of supply air through condenser.
- ⇒ Provide sufficient space around condenser for repair and maintenance works.
- ⇒ Provide sufficient space for replacing condenser.
- ⇒ Observe that the nameplate is securely placed on the condenser after installation.
- ⇒ For condensers with coating, check the coating for scratches and incompleteness. If coating is not intact, then repair the coating before start of operation of the condenser. Repair the coating according to section 9.5 or 9.5 of this Installation and Maintenance Manual.



5.2.1 Notes on setup

Before installing the condenser make sure to check and evaluate the environment of the installation site and select the correct coil for the installation. Information and support can be found in *Aluventa Selection Guideline*.

For use at special installations and environments please consult Aluventa.

Note

These recommendations on material selection for condensers are based on our experience and do not render a professional evaluation of the installation site and possible corrosion obsolete. These recommendations merely serve as factual information. We do not assume any liability for these notes being complete and correct. This information supports the professional evaluation of the installation site.

The properties of the coating are based on the experience of the coating supplier and do not render a professional evaluation of the installation site and possible corrosion obsolete. Aluventa do not assume any liability for the information on the coating being complete and correct.

5.3 Pipe connections



Danger

Risk of mortal injury due to high pressure!

- ⇒ Make sure that exclusively qualified personnel connect the pipes.
 - ⇒ Wear gloves and protective goggles.
 - ⇒ Perform welding and brazing works on condenser exclusively when condenser is pressureless.
 - ⇒ The condenser is usually filled with protective gas.
 - ⇒ Vent the protective gas filling before opening the connecting pipes.
 - ⇒ Wear protective goggles when venting protective gas.
 - ⇒ On connectors with Schraeder valves, press down valve until the pressure is completely gone.
 - ⇒ On connectors plugged with rubber plugs, slowly pull out the rubber plugs until the pressure is completely gone.
-



Warning

Damage due to dirt and corrosion!

- ⇒ Install condenser immediately after opening the pipe connectors and close pipe connectors.
 - ⇒ Close open pipe connectors immediately.
-



Warning

Damage due to copper!

- ⇒ Protect condenser from copper dust.
 - ⇒ Protect condenser from liquids containing copper.
 - ⇒ When connecting aluminium and copper pipes:
 - ⇒ Protect outside of joint against corrosion with heatshrinking sleeving or suitable tape.
-

- ⇒ Install pipes from and to condenser as follows:
 - stress-free
 - as short as possible
 - with as few bends as possible
 - with the largest possible radius for bends
- ⇒ Observe thermal expansion, aluminium expands more than copper.
- ⇒ Use exclusively clean and dry pipes and components.
- ⇒ Use exclusively pipes and components delivered in airtight packaging.
- ⇒ Make sure that it is possible to shut off condenser in case of a leakage.

When welding and brazing:

- ⇒ Use protective gas.
 - ⇒ Avoid overheating.
-



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When brazing connecting pipes on condenser:

- ⇒ Protect brazed aluminium joints on condenser and heatshrinking sleeving from overheating.
 - admissible maximum temperature for heatshrinking sleeving: 125 °C
 - admissible maximum temperature for brazed aluminium joints: 350°C
- ⇒ Use wet cloth or heat protection gel.

6 Start-up



Danger

Risk of mortal injury due to high pressure!

- ⇒ Make sure that condenser is started up exclusively by qualified personnel.
 - ⇒ Observe local start-up regulations.
 - ⇒ Make sure that pressure does not exceed admissible maximum operating pressure of condenser (see type plate) during pressure test.
 - ⇒ Start up condenser exclusively if:
 - the condenser is installed in an installation in compliance with installation and operating manual.
 - the installation, including the condenser, complies with the relevant legal provisions.
-

6.1 Prior to start-up

- ⇒ Make sure that dirt from the piping system of other parts does not get into the condenser.
- ⇒ Test the following components for leaks and check their function using a suitable test medium (e.g. dried nitrogen). connectors
 - on condenser pipes from
 - and to condenser valves
- ⇒ evacuate condenser as follows
 - Vent protective any gas filling.
 - Evacuate condenser using vacuum pump (permanent vacuum <1.5 mbar).
 - Repeat evacuation several times and interrupt with dried nitrogen.
 - Fill condenser and system with refrigerant, see type plate of system.

6.2 Start-up

- ⇒ Open valves to and from condenser.

7 Operation



Warning

Damage due to high pressure!

- ⇒ Do not exceed admissible maximum pressure (see type plate).
- ⇒ Observe local regulations.
- ⇒ Provide safety equipment against exceeding admissible maximum pressure.

-
- ⇒ Check the following data on the condenser during operation and record them in the test report:
 - air volume
 - air inlet temperature air
 - outlet temperature
 - volume flow of refrigerant
 - inlet temperature of refrigerant
 - outlet temperature of refrigerant
 - pressure loss of air flow
 - condensing pressure
 - refrigerant subcooling
 - pressure loss of refrigerant
 - type of refrigerant
 - ambient air pressure
 - air humidity



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8 Placing out of operation



Danger

Risk of mortal injury due to high pressure!

- ⇒ Make sure that condenser is placed out of operation exclusively by qualified personnel.
- ⇒ Observe local regulations.

Prior to placing out of operation:

- ⇒ Make sure that the entire installation
 - is switched off.
 - is disconnected from the mains.
 - is secured against unintentional restart.
 - ⇒ Make sure that the operating personnel are informed about the condenser being placed out of operation.
-

- ⇒ Close valves to and from condenser.
- ⇒ Pump refrigerant and refrigerant oil out of condenser.
Dispose of refrigerant and refrigerant oil according to local regulations.
- ⇒ Close pipes to and from condenser.


In case of malfunctions or damages of the condenser:

- ⇒ Inform Aluventa about any malfunctions or damages immediately.

8.1 Disposal

- ⇒ Dispose of condenser according to relevant disposal regulations.
- ⇒ Dispose of refrigerant and refrigerant oil according to relevant disposal regulations.

9 Maintenance

 <p>Warning</p>	<p>Damage due to high pressure!</p> <ul style="list-style-type: none"> ⇒ Make sure that any works on condenser are exclusively carried out by qualified and authorised personnel. ⇒ Observe EN 378-4. <p>Prior to any maintenance or repair works:</p> <ul style="list-style-type: none"> ⇒ Make sure that condenser is pressureless.
---	---

In order to guarantee correct function:

- ⇒ Check condenser regularly.

Regular maintenance

- ⇒ Check condenser for:
 - tightness
 - corrosion
 - vibrations
 - safety devices
 - damaged fins, MPE profiles and headers
 - dirty fins
- ⇒ Clean and align fins.

Note

Checking intervals depend on location, application and local regulations.

Extra maintenance

- ⇒ Check if condenser is securely fixated.
- ⇒ Check pipe to and from condenser for secure fixation and vibrations.

Note

Checking intervals depend on location, application and local regulations.

Maintenance of coating

- ⇒ Check if coating is 100% intact, if not repair the coating according to section 9.5 or 9.6
- ⇒ Check the coating for scratches. Scratches on coating must be repaired according to section 9.5 or 9.6
- ⇒ Check the cleanness of the coating and clean the coating according to section 9.2 or 9.3.

Note

Checking intervals and cleaning intervals of the coating must be done according to section 9.2 or 9.3.



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9.1 Cleaning of condenser (Un-coated)



Warning

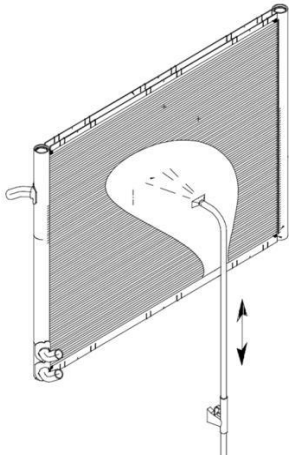
Damage due to high pressure!

When steam- or high-pressure cleaning:

- ⇒ Keep minimum distance of 400 mm.
- ⇒ Always clean against air flow direction if possible.

In order to prevent warping and damage of fins:

- ⇒ Always align cleaning jet at right angles with fins of condenser.
- ⇒ Brush exclusively in longitudinal direction of fins.
- ⇒ Test the suitability of all cleaning methods in a small spot first.



In order to guarantee an unobstructed airflow:

- ⇒ Clean condenser regularly.

In order to enable an economical and reliable operation:


- ⇒ Remove leaves, paper, dust, pollen etc. from condenser.

Note

Cleaning intervals depend on the location.

- ⇒ Always clean against air flow direction.
- ⇒ Remove dry dust and dirt or normal soiling with:
 - soft brush or hand broom
 - compressed air (3 to 5 bar)
 - industrial vacuum cleaner
 - hosepipe (water, 3 to 5 bar)
- ⇒ Remove coarse or stubborn dirt with:
 - high pressure cleaner (max. pressure 50 bar; minimum distance 400 mm; fan nozzle)
 - steam cleaner (max. pressure 50 bar; minimum distance 400 mm; fan nozzle)
 - Use neutral cleaning agent if necessary.
 - Make sure that cleaning agent has no aggressive or corrosive properties which affect aluminium or the rest of the unit.
 - Make sure that no residue of the cleaning agent is left on the condenser after the cleaning.

9.2 Cleaning of condenser with e-coating

 <p>Warning</p>	<p>Damage due to high pressure!</p> <ul style="list-style-type: none"> ⇒ Make sure that any works on condenser are exclusively carried out by qualified and authorised personnel. ⇒ only exclusively used the recommended cleaning agent <p>Prior to any maintenance or repair works:</p> <ul style="list-style-type: none"> ⇒ Make sure that condenser is pressureless.
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In order to guarantee function of the coating the suppliers *Procedures for Cleaning ElectroFin® Coated Coils* must be followed:

- ⇒ Clean condenser with intervals as specified in *Procedures for Cleaning ElectroFin® Coated Coils (appendix 1)*.
- ⇒ Clean condenser according to *Procedures for Cleaning ElectroFin® Coated Coils (appendix 1)*.
- ⇒ Clean condenser only with agents listed in *Procedures for Cleaning ElectroFin® Coated Coils (appendix 1)*.
- ⇒ Cleaning and cleaning intervals must be documented in accordance with *ELECTROFIN® COATED COIL MAINTENANCE RECORD (appendix 2)*.

Note

At any doubt make sure to consult Aluventa.

9.3 Cleaning of condenser with Blygold Microcoat

 <p>Warning</p>	<p>Damage due to high pressure!</p> <ul style="list-style-type: none"> ⇒ Make sure that any works on condenser are exclusively carried out by qualified and authorised personnel. ⇒ only exclusively used the recommended cleaning agent <p>Prior to any maintenance or repair works:</p> <ul style="list-style-type: none"> ⇒ Make sure that condenser is pressureless.
---	--

In order to guarantee function of the coating the suppliers *Cleaning specifications for Blygold Microcoat treated heat exchangers* must be followed:

- ⇒ Clean condenser with intervals as specified in *Cleaning specifications for Blygold Microcoat treated heat exchangers (appendix 3)*.
- ⇒ Clean condenser according to *Cleaning specifications for Blygold Microcoat treated heat exchangers (appendix 3)*
- ⇒ Clean condenser only with agents listed in *Cleaning specifications for Blygold Microcoat treated heat exchangers (appendix 3)*
- ⇒ Cleaning and cleaning intervals must be documented in accordance with *Blygold Microcoat cleaning log (appendix 4)*

Note

At any doubt make sure to consult Aluventa



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9.4 Repair of condenser


Any damage to pressure parts of the condenser must be checked and evaluated:

- ⇒ Any damages must be checked and evaluated to determine if safe operation of condenser can continue
- ⇒ If doubt then contact Aluventa for support
- ⇒ If risk of leak will occur the condenser must be scraped and replaced.
- ⇒ Physical damages and leaks onto MPE-tubes and Header cannot be repaired and coils must be replaced.
- ⇒ Physical damage to connection tubes or Cu/Al joints, contact Aluventa for support.

Note

At any doubt make sure to consult Aluventa.

9.5 Repair of e-coating

 <p>Warning</p>	<p>Damage due to high pressure and chemical!</p> <ul style="list-style-type: none">⇒ Make sure that any works on condenser are exclusively carried out by qualified and authorised personnel.⇒ only exclusively use the recommended repair kit <p>Prior to any maintenance or repair works:</p> <ul style="list-style-type: none">⇒ Make sure that condenser is pressureless.
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Any damage to the e-coating must be repaired to ensure 100% intact coating.

- ⇒ Any physical damages must be checked and evaluated to determine if safe operation of condenser can continue
- ⇒ If doubt then contact Aluventa for support
- ⇒ Physical damages to the coating must be repaired exclusively using repair kit from Aluventa.
- ⇒ Any repair of any damage must be documented and recorded with the following info:
 - Technician name and qualification
 - Date of repair
 - Proof of not physical damage to condenser
 - Size of damage
 - Location of damage
 - Repair kit used
 - Documentation of damage after repair

Note

Repair kit and explanation can be requested at Aluventa. At any doubt make sure to consult Aluventa.

9.6 Repair of Blygold Microcoat

 <p>Warning</p>	<p>Damage due to high pressure and chemical!</p> <ul style="list-style-type: none">⇒ Make sure that any works on condenser are exclusively carried out by qualified and authorised personnel.⇒ only exclusively use the recommended repair kit <p>Prior to any maintenance or repair works:</p> <ul style="list-style-type: none">⇒ Make sure that condenser is pressureless.
---	---

Any damage to the e-coating must be repaired to ensure 100% intact coating.

- ⇒ Any physical damages must be checked and evaluated to determine if safe operation of condenser can continue
- ⇒ If doubt then contact Aluventa for support
- ⇒ Physical damages to the coating must be repaired exclusively using repair kit from Aluventa.
- ⇒ Any repair of any damage must be documented and recorded with the following info:
 - Technician name and qualification
 - Date of repair
 - Proof of not physical damage to condenser
 - Size of damage
 - Location of damage
 - Repair kit used
 - Documentation of damage after repair

Note

Repair kit and explanation can be requested at Aluventa. At any doubt make sure to consult Aluventa.

10 Troubleshooting

In case of malfunctions of the condenser:

- ⇒ Shut condenser down (see Placing out of operation).
- ⇒ Inform Aluventa application center.
- ⇒ Replace or repair leaking condenser.

Note

The Aluventa application center will inform you about repair possibilities.

11 Contact

Headquarters

Aluventa A/S

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5700 Svendborg

Denmark

Phone: +45 (0) 632 23 300

Fax: +45 (0) 632 23 301

Appendix 1

Procedures for Cleaning ElectroFin® Coated Coils

The following cleaning procedures are recommended as part of the routine maintenance activities for ElectroFin® Coated Coils. **Documented routine cleaning of ElectroFin® coated coils is required to maintain warranty coverage under the Luvata ElectroFin® Terms and Conditions of Sale.**

WARNING: Prior to cleaning the unit, turn off and lock out the main power switch to the unit and open all access panels.

Remove Surface Loaded Fibers

Surface loaded fibers or dirt should be removed prior to water rinse to prevent further restriction of airflow. If unable to back wash the side of the coil opposite that of the coils entering air side, then surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a ***soft non-metallic*** bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges bent over) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Periodic Clean Water Rinse

A ***monthly*** clean water rinse is recommended for coils that are applied in coastal or industrial environments to help to remove chlorides, dirt and debris. It is very important when rinsing, to water temperature is less than 130° F and pressure is than 900 psig to avoid damaging the fin edges. An elevated water temperature (not to exceed 130° F) will reduce surface tension, increasing the ability to remove chlorides and dirt.

Routine Quarterly Cleaning of ElectroFin® Coated Coil Surfaces

Quarterly cleaning is essential to extend the life of an ElectroFin® coated coil and is required to maintain warranty coverage. Coil cleaning shall be part of the unit's regularly scheduled maintenance procedures. Failure to clean an ElectroFin® coated coil will void the warranty and may result in reduced efficiency and durability in the environment.

For routine quarterly cleaning, first clean the coil with the below approved coil cleaner (see approved products list under Recommended Coil Cleaners section). After cleaning the coils with the approved cleaning agent, use the approved chloride remover (under the Recommended Chloride Remover section) to remove soluble salts and revitalize the unit.

Recommended Coil Cleaner

The following cleaning agent, assuming it is used in accordance with the manufacturer's directions on the container for proper mixing and cleaning, has been approved for use on ElectroFin® e-coat coils to remove mold, mildew, dust, soot, greasy residue, lint and other particulate:

<u>Product</u>	<u>Reseller</u>	<u>Part Number</u>
Enviro-Coil Concentrate	HYDRO-BALANCE CORPORATION TELEPHONE: 800 527-5166 FAX: 972 394-6755 P.O. Box 730 Prosper, Texas 75078	H-EC01
Enviro-Coil Concentrate	Home Depot Supply	H-EC01

Recommended Chloride Remover

CHLOR*RID International, Inc
PO Box 908
Chandler, Arizona 85244
Bus:(800) 422-3217
Bus Fax: (480) 821-0364

CHLOR*RID DTS™ should be used to remove soluble salts from the ElectroFin® coated coil, but the directions must be followed closely. This product is not intended for use as a degreaser. Any grease or oil film should first be removed with the approved cleaning agent.

1. **Remove Barrier** - Soluble salts adhere themselves to the substrate. For the effective use of this product, the product must be able to come in contact with the salts. These salts may be beneath any soils, grease or dirt; therefore, these barriers must be removed prior to application of this product. As in all surface preparation, the best work yields the best results.

2. **Apply CHLOR*RID DTS** - Apply CHLOR*RID DTS directly onto the substrate. Sufficient product must be applied uniformly across the substrate to thoroughly wet out surface, with no areas missed. This may be accomplished by use of a pump-up sprayer or conventional spray gun. The method does not matter, as long as the entire area to be cleaned is wetted. After the substrate has been thoroughly wetted, the salts will be soluble and is now only necessary to rinse them off.

3. **Rinse** - It is highly recommended that a hose be used, as a pressure washer will damage the fins. The water to be used for the rinse is recommended to be of potable quality, though a lesser quality of water may be used if a small amount of **CHLOR*RID DTS** is added. Check with CHLOR*RID International, Inc. for recommendations on lesser quality rinse water.

CAUTION:

Harsh Chemical and Acid Cleaners

Harsh chemicals, household bleach or acid cleaners should not be used to clean outdoor or indoor ElectroFin® coated coils. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion and attack the ElectroFin® coating. If there is dirt below the surface of the coil, use the recommended coil cleaners as described above.

CAUTION:

High Velocity Water or Compressed Air

High velocity water from a pressure washer or compressed air should only be used at a very low pressure to prevent fin and/or coil damages. The force of the water or air jet may bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdowns may occur.



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Appendix 2

ELECTROFIN® COATED COIL MAINTENANCE RECORD																				
Installation Site _____					Installation Date _____															
Unit Model # _____					Unit Location _____															
Unit Serial # _____					Customer _____															
Year 20__	Ambient Temp (°F)	Surface Debris Removed	Coil Cleaned	Approved Cleaner Used	Potable Water Backwash Rinse	Potable Water Frontwash Rinse	Chlorides Removed	Comments												
Jan																				
Feb																				
Mar																				
Apr																				
May																				
Jun																				
Jul																				
Aug																				
Sep																				
Oct																				
Nov																				
Dec																				
<p>The following cleaning agents have been approved for use on ElectroFin® coated coils to remove mold, mildew, dust, soot, greasy residue, lint and similar particulate without harming the coated surfaces:</p> <table border="1"> <thead> <tr> <th>CLEANING AGENT</th> <th>RESELLER</th> <th>PART NUMBER</th> <th>RECOMMENDED CHLORIDE REMOVER</th> </tr> </thead> <tbody> <tr> <td>Enviro-Coil Concentrate</td> <td>HYDRO-BALANCE CORPORATION P.O. Box 730 Prosper, Texas 75078 (P)800.527.5166 (F) 972.394.6755</td> <td>H-EC01</td> <td>CHLOR-RID International, Inc. P.O. Box 908 Chandler, Arizona 85244 (P) 900.422.3217 (F) 480.821.0364</td> </tr> <tr> <td>Enviro-Coil Concentrate</td> <td>Home Depot Supply</td> <td>H-EC01</td> <td></td> </tr> </tbody> </table>								CLEANING AGENT	RESELLER	PART NUMBER	RECOMMENDED CHLORIDE REMOVER	Enviro-Coil Concentrate	HYDRO-BALANCE CORPORATION P.O. Box 730 Prosper, Texas 75078 (P)800.527.5166 (F) 972.394.6755	H-EC01	CHLOR-RID International, Inc. P.O. Box 908 Chandler, Arizona 85244 (P) 900.422.3217 (F) 480.821.0364	Enviro-Coil Concentrate	Home Depot Supply	H-EC01		
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Enviro-Coil Concentrate	Home Depot Supply	H-EC01																		
<p>Failure to maintain coil coatings using the ElectroFin® coil cleaning procedures and to record such maintenance on this record, will void the ElectroFin® warranty for coil coatings</p>																				

Appendix 3

Cleaning specifications for Blygold Microcoat treated heat exchangers

Heat-exchangers that are treated with Blygold Microcoat are protected against corrosive environments. To make sure that these protective properties last for a long period the heat-exchanger requires thorough cleaning at least twice a year.

The following procedure must be followed and filed:

- Chemical and mechanical cleaning of Blygold Microcoat coated heat exchangers.
- Take necessary measures to protect the environment.
- For proper cleaning there must be access to both sides of the coil.
- Remove any loose dirt, (leafs etc.).
- Adjust the fins with a special comb.
- Vacuum clean coils with soft brush at air-entry side.
Brush fin edges with a non-metal soft brush to loosen particles, vacuum and clean frontal surface.
- Clean chemically-technically with moderate pressure and mild detergent (see spec's below) and, preferably warm tap water. Start cleaning from inside to outside against the airflow direction.
- Clean the air entry side the same way as to air exit side of the coil.
- If warm water is not available a cleaning step with Chlor-rid® DTS is required to remove remaining salt deposits.
- Completely wet the heat-exchanger surface by spraying diluted Chlor-rid® DTS (check product info at www.chlor-rid.com)
- Rinse with high-pressured clean tap water from both sides of the coil.
- Dry with high-pressure air! Make sure all water between fin and tubes is blown out of the heat exchanger.
- Re-mount all dismantled parts

Which products can be safely used for cleaning Blygold treated heat exchangers?

Cleaning agents can be divided into several types. Some will be more aggressive than others, and all have their strong and weaker sides. For coil cleaning the following properties are required from the cleaning agent:

- ❖ Active at low temperatures
- ❖ Non aggressive to metals
- ❖ Disposal at sewage allowed
- ❖ High pollution dissolving capacity
- ❖ Average to high foaming capacity
- ❖ Non aggressive to coating

These requirements result into the following specification for coil cleaning products:

- ❖ pH between 5 and 9 (Chlor-rid DTS can be used at pH 3.3 when rinsed directly afterwards)
- ❖ No hydroxide (aggressive to aluminum)
- ❖ No chloride compounds
- ❖ Low solvent compounds (< 4 %)
- ❖ No meta-silicate (leaves silicates at surface that can possibly affect coating adhesion (touch-up))
- ❖ No phosphates compounds (will increase degreasing but has a negative effect on environment)



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Appendix 4

Blygold Microcoat cleaning log

Unit serial number: _____

Unit model number: _____

Visitation date	Remove pollution (leafs, dirt etc)	Clean coil	Products used:	Rinse front & back	Check coil	Water temp Celsius	Comments:

Water temperature used for cleaning and rinsing should be 50° C:
 Cleaning detergent used should be CoilClean or similar (www.blygold.com).
 Chloride remover, available at Chlor-Rid International, (www.chlor-rid.com)





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