



Protection against corrosion



Corrosion:

According to DIN 50900 it is a reaction of a metallic substance with its environment.

- Almost always electrochemical
- An electrolyte is the cause for this type of material destruction

How does an electrolyte form:

If the air in the environment contains salts, acids or alkali, together with condensation water these substances form an electrolyte, i.e. a change of state occurs between two substances in which one dissolves or is at least destroyed.

In bakeries as well as in sausage production, spice mixtures and preservatives are being ground finer and finer so that the mixture is as homogenous as possible. In salt curing, cutter processes and processes where intestines are used, salts also enter the surrounding air. These small particles (harmful substances) are deposited on the surfaces of the coolers and damage the material.

The stricter hygiene regulations within the EU require the use of harsher cleaning and disinfectant agents in both the alkali and the acid range. If they are not properly neutralised, they are another cause of material damage.

For these applications we offer special corrosion protection designs that protect against such aggressive environments.

The degree of corrosion depends on the amount of moisture on the surface of the heat exchanger. The following specifications are recommendations and the planner and refrigeration contractor should rely on their own experience as well.

When using cleaning and disinfection agents pay attention to their compatibility with epoxy-based coatings, aluminium and copper (a variety of agents are not suitable in these cases). The protective coating and the „goldlack“ coating on the fins react to sodium hydroxide, for example.



Maintenance and service

In general, Küba Air Coolers do not require maintenance. In accordance with the hygiene regulations for the given application, the forced convection air cooler must be cleaned at regular intervals.

The degree of related contamination affects the effectiveness of the fan-air cooler. As a result, regular cleaning with cleaners compatible with the materials in the air cooler is required. Only the cleaners compatible with the materials in the cooler may be used, taking the manufacturer's instructions for application into account (e.g. mixture ratio, duration of exposure, finishing treatments).

When using steam or high-pressure cleaning, do not spray the electrical connection areas directly.

Before undertaking any maintenance or cleaning work, ensure that the electrical connections for the cooler are all disconnected from the mains and cannot be switched back on.



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When using cleaning and disinfection agents, please pay attention to their compatibility with the materials used in the product and observe the specifications given in the manufacturer's safety data sheets regarding their cleaning and disinfection agents.

Short overview

Slightly aggressive air in the environment:	Cold storage areas for fruits and tropical fruits Cold storage areas for pharmaceutical products
Very aggressive air in the environment:	Cold storage areas for smoked meats and fish, Salt curing rooms Malt houses Industrial facilities: steel mills, foundries Swimming pools Cold storage areas for fresh salads and marinades Cheese ripening rooms

Application	Air in the environment	Protection class	Construction			Casing	Note
			Tube	Fin	End plate		
Regular cleaning and disinfection							Important: rinse well and neutralise
➤ Type of cleaning or disinfection	e.g. foam or manual process, etc.						
➤ The concentration must be known	cleaning agents that contain chlorine, acids or alkali	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	Sometimes VA casing required
Baked goods							
➤ Deep-freeze storage area	no exposure	none	Cu	Al	Al	Al / galvanised steel	Fin spacing at least 7 mm
➤ Blast freezing rooms	no exposure	none	Cu	Al	Al	Al / Steel	Fin spacing at least 7 mm
➤ Fermentation interrupter / machines	organic compositions dust, vapours including baking ingredients	V6.03	VA	Al	Al	Al / galvanised steel, coated (one side)	Fans with speed controllers
Beverages							
➤ Fermenting cellar / wine	low CO ₂ content	V6.03	VA	Al	Al	Al / galvanised steel, coated (one side)	
	higher CO ₂ content or sulphur or chlorine	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
➤ Fruit juice filling systems	acids, e.g. lemon, wine or sulphuric acids	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	Air speed Observe if people are present
➤ Mineral water filling systems	Aerosols	V6.01	Cu	Al „goldlack“	Al-sl	Al, protective coating (both sides) / galvanised steel, coated (both sides)	Observe air speed if people are present
➤ Malt houses	Organic acids, aggressive dusts, high protein levels	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	

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Application	Air in the environment	Protection class	Construction				Note
			Heat exchanger		Casing		
			Tube	Fin		End plate	
Cheese							
> Storage	Low NH ₃ content, low relative humidity	V6.01	Cu	Al „goldlack“	Al-sl	Al, protective coating (both sides)/galvanised steel, coated (both sides)	With very low exposure, normal standard design is possible
	Low NH ₃ content, high relative humidity	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	
> Ripening rooms	High NH ₃ content, high relative humidity	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	Little air movement
Fruits / vegetables							
> Citrus fruits	High fruit acid content	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	Low dehumidification at low DT1 / low airspeed during long-term storage
> Other tropical fruits		V6.01	Cu	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	
> Bananas	Corrosive vapours from banana peels	V6.03	VA	Al	Al	Al/galvanised steel, coated (one side)	Note high external pressure
> Vegetables		Standard	Cu	Al	Al	Al/galvanised steel	For optimum ventilation note stacking plans
Meat / sausage							
> Deep-freeze storage area (packaged / unsealed goods)	No exposure	Standard	Cu	Al	Al	Al/galvanised steel	Recommended accessories: Shut-Up® and Defrosting hood
> Cold storage area for raw/fresh meats	No exposure	Standard	Cu	Al	Al	Al/galvanised steel	
> Rapid cooling for carcasses	Organic compositions, cleaning agents	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	High air flow rate required
> Smoked meat / sausage	Organic acids, amines	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	
> Salt curing rooms	Salts, organic acids	V6.02+ V3.12	VA	Al „goldlack“	VA	VA	
> Offal	Organic acids, cleaning agents	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	
Central storage area							
> Picking / distribution	Dust, debris, etc.	Standard	Cu	Al	Al	Al/galvanised steel Al/galvanised steel	
		V6.04	Cu	Al „goldlack“	Al		
> Frozen storage areas	No exposure	Standard	Cu	Al	Al	Al/galvanised steel	Recommended accessories: Shut-Up® and Defrost hood
Marinades / ready-to-eat salads							
> Occasional open storage	Salts, acids, vinegar, preservatives	V6.01	Cu	Al „goldlack“	Al-sl	Al, protective coating (both sides)/galvanised steel, coated (both sides)	
> Frequent open storage		V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides)/galvanised steel, coated (both sides)	
Dairy facilities							
> Low percentage	Vapours from lactic and butyric acids	V6.01	VA	Al „goldlack“	Al - sl	Al, protective coating (both sides)/galvanised steel, coated (both sides)	



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Application	Air in the environment	Protection class	Construction			Note	
			Heat exchanger		Casing		
			Tube	Fin	End plate		
➤ High percentage	Vapours from lactic and butyric acids	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
Fish / seafood							
➤ Preparation rooms	Amines, salts	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	Observe air speed if people are present
➤ Storage rooms, including deep-freeze		V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	Recommended accessories: Shut-Up® and defrost hood
Coffee							
➤ Roasters	Organic acids	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
Pastry shops							
➤ Candy manufacturers		V6.01	Cu	Al „goldlack“	Al-sl	Al, protective coating (both sides) / galvanised steel, coated (both sides)	Little air movement
➤ Preparation of icing / frosting		V6.01	Cu	Al „goldlack“	Al-sl	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
Swimming pools							
➤ Dehumidification	Chlorine gas, muriatic acid, (cleaning agents)	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
Kiln drying							
➤ Hardwoods (e.g. oak, tropical woods)	Organic acids (folic acid), cresylic acid, ammonium	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
➤ Softwoods (e.g. spruce, fir, pine)	Low amounts: organic acids; resins	V6.03	VA	Al	Al	Al / galvanised steel, coated (one side)	
Industrial facilities							
➤ Crane cabs in steel mills / foundries	Aggressive gases (chlorine), sulphur dioxide, metallic dusts	V6.03	VA	Al	Al	Al / galvanised steel, coated (one side)	
Grains, animal feeds							
➤ Storage rooms	Dust, often moist	Standard	Cu	Al	Al	Al / galvanised steel, coated (one side)	
Sea air (no direct seawater)							
➤ Cold rooms near the sea	Air with slight salt content	V6.01	Cu	Al „goldlack“	Al-sl	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
➤ Cold rooms near the sea	Air with high salt content	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	
Cattle sheds / intensive animal husbandry							
➤ Heat recovery	NH ₃ , atmosphere, sulphur compositions, dusts	V6.02	VA	Al „goldlack“	VA	Al, protective coating (both sides) / galvanised steel, coated (both sides)	

Key

- Al = Aluminium
- Al „goldlack“ = Aluminium epoxy resin coating, „goldlack“ coating
- Cu = Copper
- VA = Stainless steel, depending on application V2A= 1.4301 or V4A= 1.4404