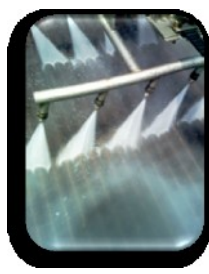




AFC CLEANING

EXTERNAL CLEANING OF AIR FIN COOLERS





AFC CLEANING

INTRODUCTION

AFC specialises in custom designed cleaning systems for air fin coolers (AFC). The company **AFC** Cleaning (Pty) Ltd is based in Gauteng, the economic heart of South Africa.

AFC Cleaning (Pty) Ltd services refineries, steel plants, power stations, chemical plants, and paper/pulp processing plants.

AFC would like to expand its footprint to the rest of the world by engaging well established service companies who will utilise our products in their relevant markets.

Today's competitive and evolving markets require service providers to be progressive and dynamic in their thinking, with visions far greater than their surroundings, which are able to set aside things of the past and to building the future with enthusiasm. At **AFC** Cleaning (Pty) Ltd we aim to shift all paradigms and ensure sustainable development of our business, products, services and employees, to the mutual benefit of both us and our customers.

Semi-automatic cleaning system for Air Fin Coolers (AFC)

With the cleaning system of **AFC** Cleaning (Pty) Ltd it is possible to wash out the known fouling which occurs in **AFC's** (like leaves, insects, dust, sand etc.).

Our cleaning systems constitute the following components:

1. **Chassis for cleaning system:** Aluminium and stainless steel .
2. **The drive unit:** Geared motor unit with special pulleys which drive the nozzle beam vertically along the chassis.
3. **Nozzle beam:** Has two rows of nozzles, total 12 nozzles.
4. **Control Unit:** It Controls the drive unit and the speed of the nozzle beam.
5. **Low Pressure high volume Pump:** The LP-pump supplies the nozzle beam with the required water and set pressure through connected LP-hoses.
Max 70 Bar.



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HIGH PRESSURE CLEANING REPORT

710/3210 UHDE CTFE PROJECT

No damage to the fins. HIGH PRESSURE CLEANING OF AIR COOLED HEAT EXCHANGER FINS

Agenda point 2.15 of the air cooler bid clarification (15/05/2012 at 12:30, UHDE Sunninghill) requires AFC to demonstrate that tube fins are strong enough to withstand any deformation or damage resulting from high pressure water cleaning, regardless of the fin pitch proposed. The tube samples that were tested are listed below in Table 1.

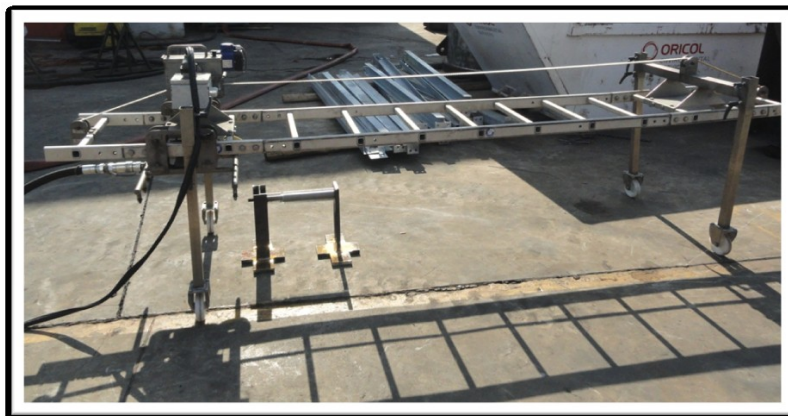
Table 1: Tube sample specifications

VARIABLE	ITEM A	ITEM B
Tube outer diameter	38.1 mm	25.4 mm
Tube wall thickness	3.4 mm	2.77 mm
Finning outer diameter	63.5 mm	57 mm
Fin pitch (FPI)	9	11

Testing procedure and results

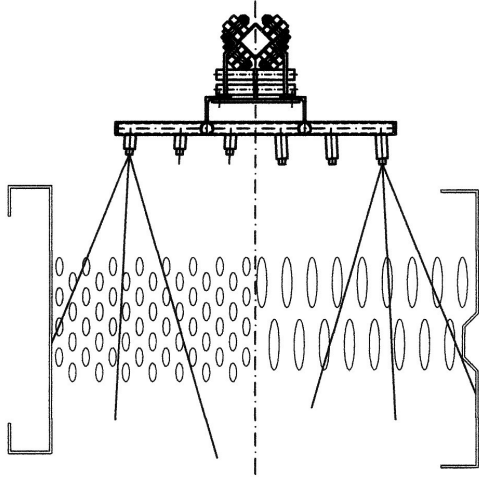
The test was performed on Monday, 18/06/2012, at 13:00. Figure 1 shows the rig used for the high pressure cleaning test. Water was sprayed through the nozzles onto the tube samples at an average normal cleaning pressure of 70 bar and average water flow rate of 200 l/min by moving it across the length of the tubes.

Selected fins were clearly marked before the test and the over fin diameter was measured. This was then re-measured after the test and no change was inspected, which translates to no fin damage or deflection. A visual inspection also showed no damage to the fins.

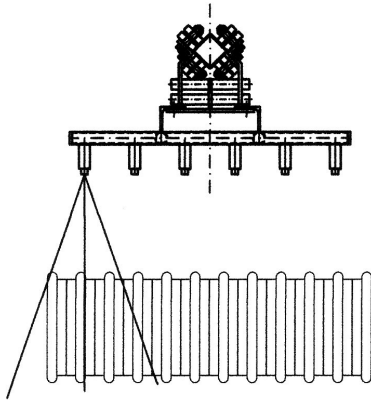




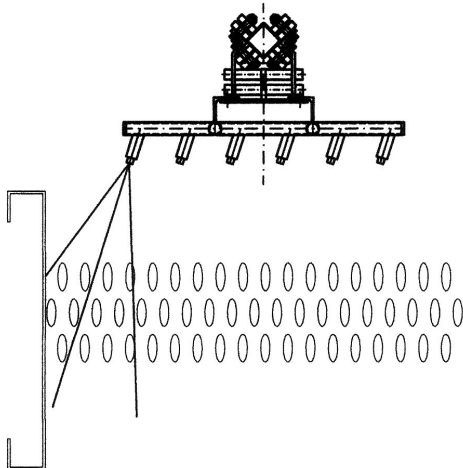
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**GEA-Dualrohr klein/groß
Düsenanstellung 3°**



**Alex-Bündel (GEA)
Flair-Bündel (Balcke, Hanon)
Düsenanstellung 0°**

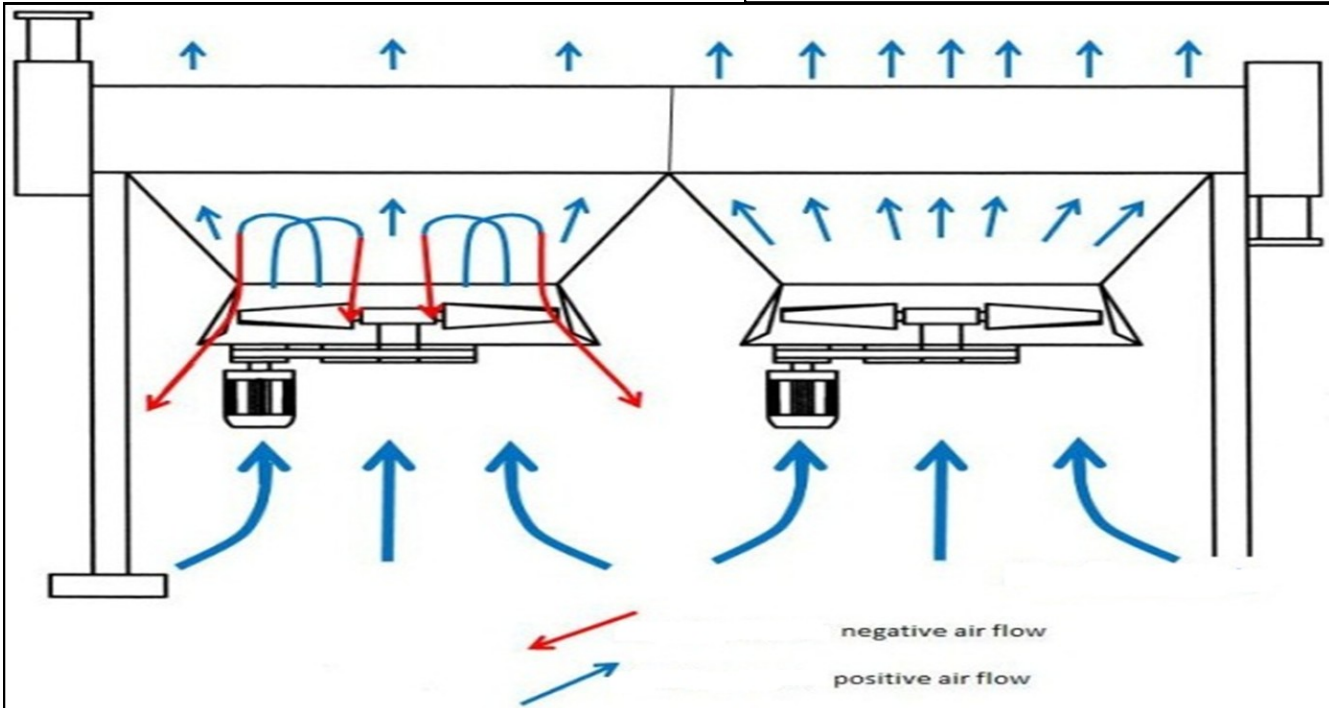
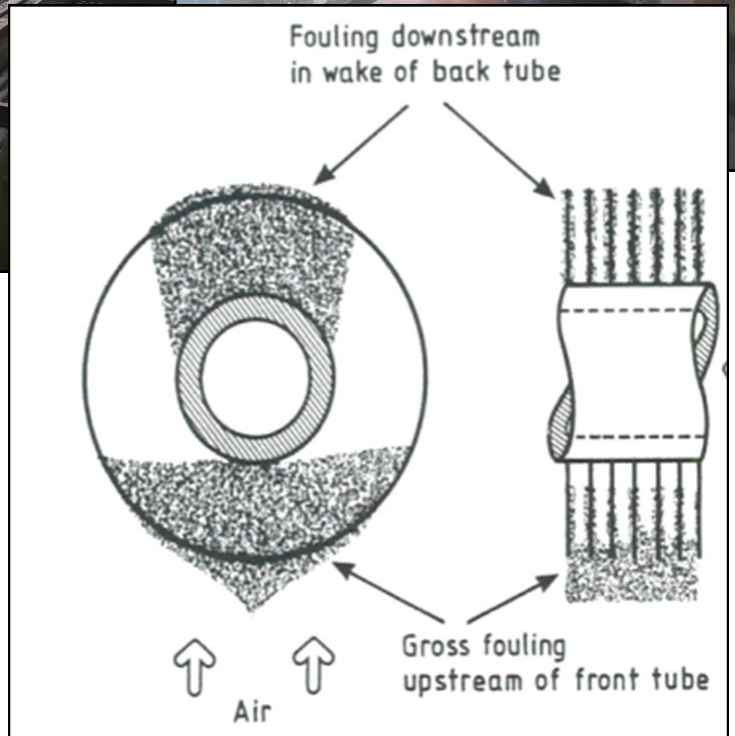


**Balcke-Rippenrohrbündel
Düsenanstellung 17,5°**



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Oil coolers



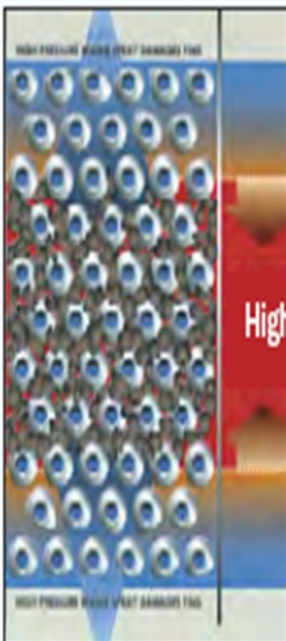


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Comparison to manual cleaning

Classic Manual Cleaning with hand lance:

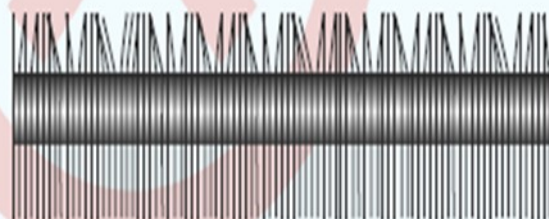
- causes fins damage
- not efficient (bundles remain dirty inside)



High pressure water can flatten and damage fragile cooling fins and will compact the dirt and debris toward the center of the heat exchanger. Over time, these conditions contribute to the breakdown of the cooling process, long term damage, reduced production, and increased cost.

High pressure cleaning from above & below compacts debris towards the center of heat exchanger

COSTLY FIN DAMAGE



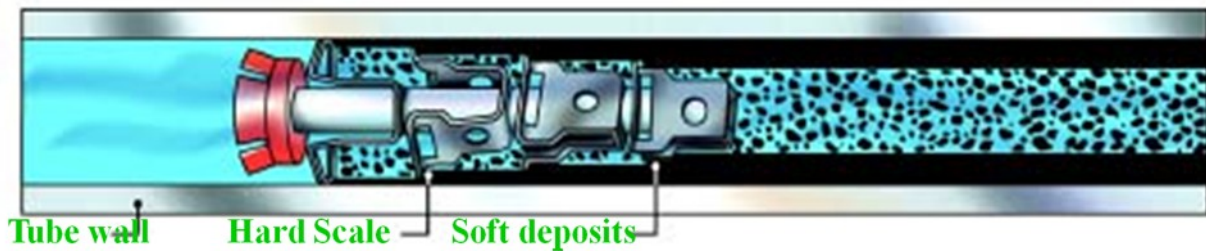


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Internal Tube cleaning (ITC)

How does it work?

Through the water flushing action, all soft and hard deposits are shot out ahead of the cleaners, leaving the tubes in an as-new condition.



'A Whole New Game Plan'

The Pro's of using the cleaners "bullets" for internal cleaning:

- Effective at all kinds of deposits
- Effective cleaning of all tubes
- Spring loaded "bullets" for uniform cleaning
- Improves tube surface, by removing pitting & other deposits
- Possibility of taking selective deposit samples
- Longer operating life of tubes when done regularly
- Quick performance (3-6m/sec)

The ITC cleaning process





Your eddy current experts: ec-works answers to FAQ

Question	ec-works answer	ec-works remarks / benefits
Eddy Current Standard probes; available sizes and basic scopes?	<ul style="list-style-type: none"> ec-works standard integral bobbin inspection probes are: <ul style="list-style-type: none"> - used simultaneously in differential and absolute modes - equipped with long lasting and replaceable centralisers - always on stock from 5 to 150 mm (3/16" to 6" inch). Designed and manufactured at ec-works workshops Carry the expertise of 35 years of experience, useful for many of the most common inspection task as for example: all kinds of erosion related defects, including pitting corrosion, most crack related defects and many other defects 	<ul style="list-style-type: none"> This guarantees: <ul style="list-style-type: none"> - highest sensitivity, - lowest costs and - shortest reaction times all in one. Fast design and manufacturing of tailor made eddy current probes The sensitivity of standard probes starts at \varnothing 0.6 mm for non-ferrite materials; for ferrous materials it starts at about the size of its wall thickness
What are the cleaning requirements for an eddy current inspection with standard probes?	<ul style="list-style-type: none"> Only internally clean tubes are necessary: only access to the internal tube surface is required, a gap of 1mm is the standard requirement to archive high sensitivity, smaller probe diameters result in lower sensitivity 	<ul style="list-style-type: none"> No action required at the shell site of the heat exchanger tubes; shell can be filled up with the normal service fluid / gas Inspection of coated tubes possible
What different types of integral standard probes are available?	<ul style="list-style-type: none"> Standard Integral Bobbin Probes for non-ferromagnetic materials as well as all kinds of Austenitic Stainless Steels, Titanium, all Copper and Copper Alloys (Brass / CuNi), Aluminium and other metals, Graphite tubes Standard Integral PSEC Probes for ferromagnetic materials as Carbon Steel, Duplex Steels or Nickel tubes <p>PSEC = Partial Saturated Eddy Current</p>	<ul style="list-style-type: none"> Very fast and sensitive tool for most defect types, defects starting at \varnothing 0.6 mm can be detected Fast and sensitive tool for the inspection of all kinds of Carbon Steel tubes incl. Finned Air Coolers, defects starting at a size roughly similar to the wall thickness, e.g. at a 25.4 mm x 2.0 mm tube with \varnothing 2.0 mm defect size



Why using ec-works for eddy current inspection

Arguments	Description	Remarks/Benefits
Kind of company	<ul style="list-style-type: none"> Specialized in eddy current technique, nothing else Solutions for inspection problems of all kind of heat exchanger e.g. condenser, distiller, preheater, cooler, not only a "service company" 	<ul style="list-style-type: none"> Development of probes, software, manipulators and test pieces with artificial defects for the right calibration
Size of company	<ul style="list-style-type: none"> 35 people, not to small for big jobs and not to great to provide high quality service anytime 	<ul style="list-style-type: none"> Up to 10 Teams parallel on one job More than 20 equipments available
Experience	<ul style="list-style-type: none"> Most of operators 10 years up to 15 years Supervisor up to 25 years 	<ul style="list-style-type: none"> Reliability of the interpretation of the eddy current signals is on the highest level <p>(the most important thing to get right results)</p>
Equipment	<ul style="list-style-type: none"> Newest available eddy current instruments Multi channel systems for differential and absolute method to find small defects(pittings, cracks) and large scale defects (erosion, overall thinning)only by one run of the probe 	<ul style="list-style-type: none"> Own probe construction and manufacturing All software made by own employees Own workshop for mechanical and electrical solutions
Documentation	<ul style="list-style-type: none"> Always possible to do, anytime Picture of tube sheet with defect classes Plugging plan, immediately available after inspection of last tube Summary in many kinds 	<ul style="list-style-type: none"> Actual results for meetings Discussion with real information how to continue the inspection work Making decisions during the eddy current job for calculation of new tubes or plugs
References	<ul style="list-style-type: none"> Nuclear power plants in Europe Conventional power plants worldwide Refineries in Europe Chemical plants worldwide 	<ul style="list-style-type: none"> RWE, EON, Vattenfall, Eskom Siemens, Alstom, Babcock Borsig Shell, Exxon, BP, Conoco, Agip, Total, Kuwait Petroleum, Orlen Krupp Uhde, Linde, BASF, Hoechst

Please note: you never get the best results for the cheapest price



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Adiabatic cooling by AKI Tech

AFC holds the agency for AKI Tech for Southern Africa

Heat exchangers or coolers, serve the removal of heat energy. The coolers are too small, have lost power or the extreme summer temperatures no longer deal with it may be a catastrophic failure of the cooling system.

This means for food production, data centres, or the air conditioning: spoiled goods, loss of production, server outages, declining productivity, etc.

Advantages of adiabatic cooling through high pressure atomization:



- ❖ no restriction of the design of the coolers, V cooler, vertical-, flat-, and multi-tiered cooler.

- ❖ Humidification performance up to 14 g /

- ❖ through the misting may have be wets, so > 100% rel. hum. Moisture to dissipate heat

- ❖ No air resistance due to standing water on the fins(mostly at table cooler) also no static problems due to weight.



Our products are completely safe & non toxic, & offer a new model for green chemistry that improves the health of ecosystems.



Lakes & Dams



Solid Waste Odor



Wastewater treatment



Water Clarification



Cooling Water treatment



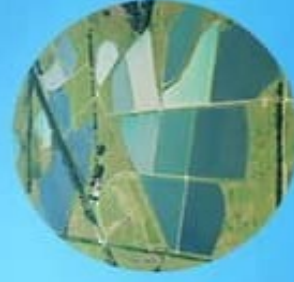
Sports & Turf



Agriculture



Composting & Animal Care



Aquaculture



Irrigation systems treatment



Anaerobic Digestion



FOG Clogging



Enzymatic Cleaning