
ALFA
LAVAL

Alfa Laval in brief

- Alfa Laval is a leading global provider of specialized products and engineered solutions.
  Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.
- We help our customers to heat, cool, separate and transport products such as oil, water and chemicals.

We serve most industries

Biofuels

Biotech and pharmaceutical

Chemicals

Crude oil refinery

Engine and transport

Fluid power

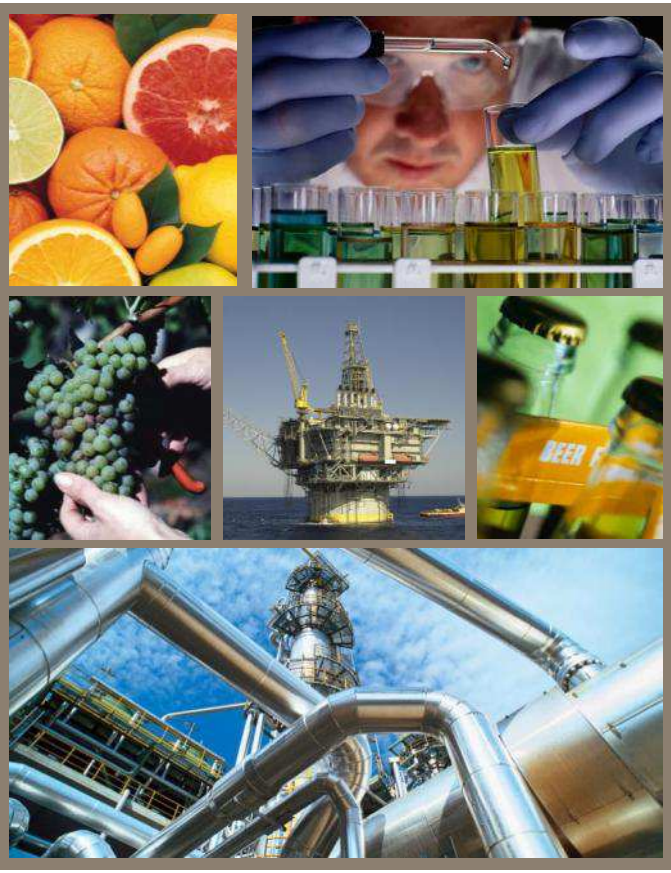
Food and beverages

HVAC

Industrial fermentation

Latex

Machinery



Marine and diesel

Metal working

Mining and mineral processing

Oil and gas

Power

Pulp and paper

Refrigeration and air-conditioning

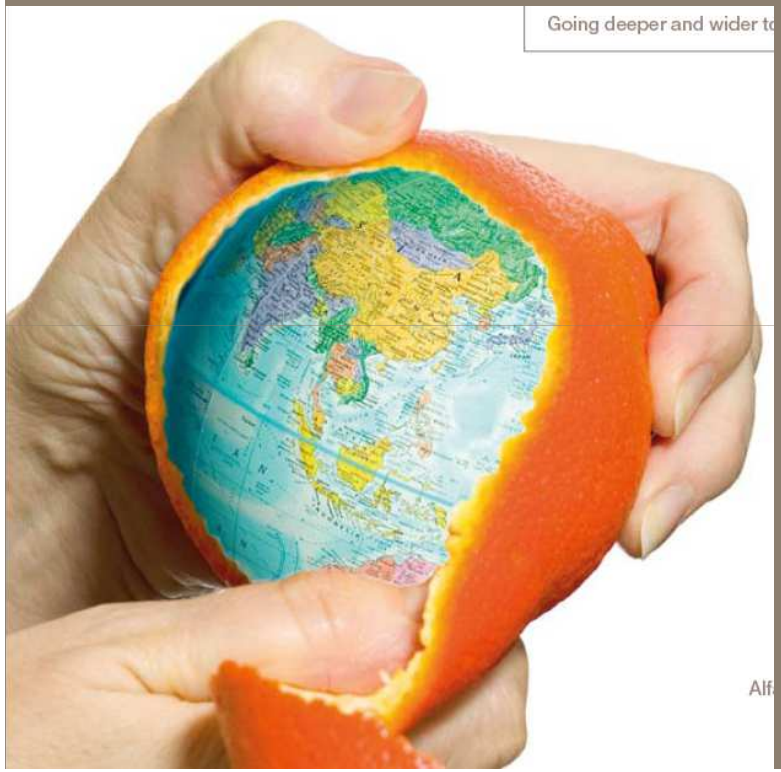
Semiconductor systems

Steel and coke oven gas

Sugar

Wastewater treatment

A global company

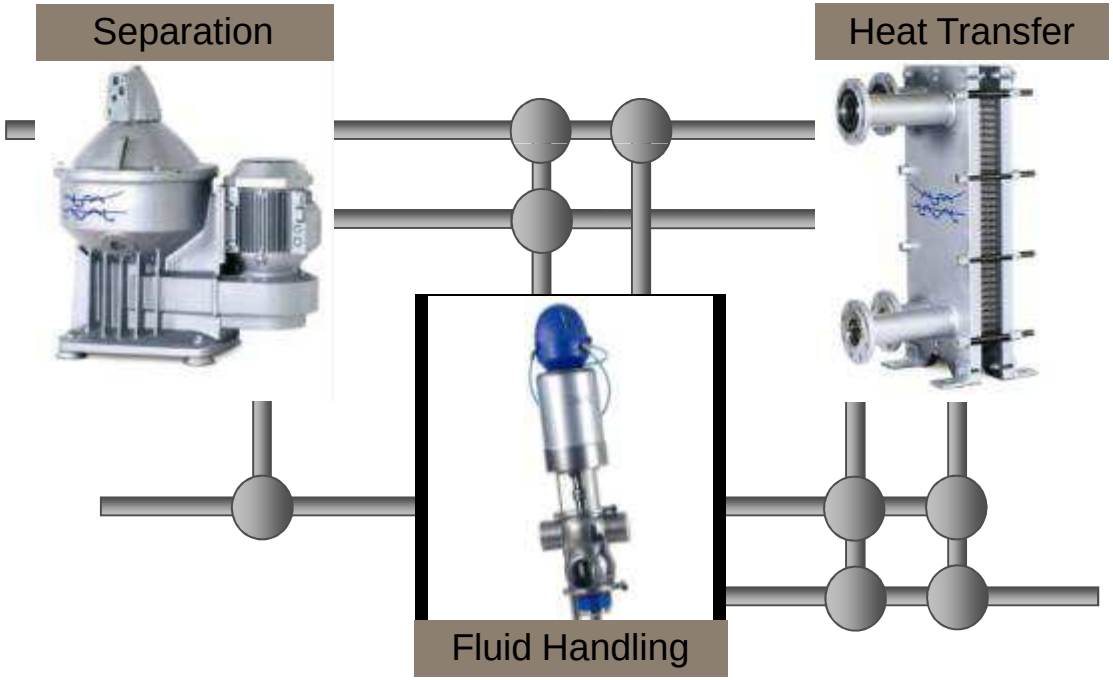


- 37 manufacturing units*
- 102 service centres
- Sales companies in 55 countries
- Other sales representation in 45 countries

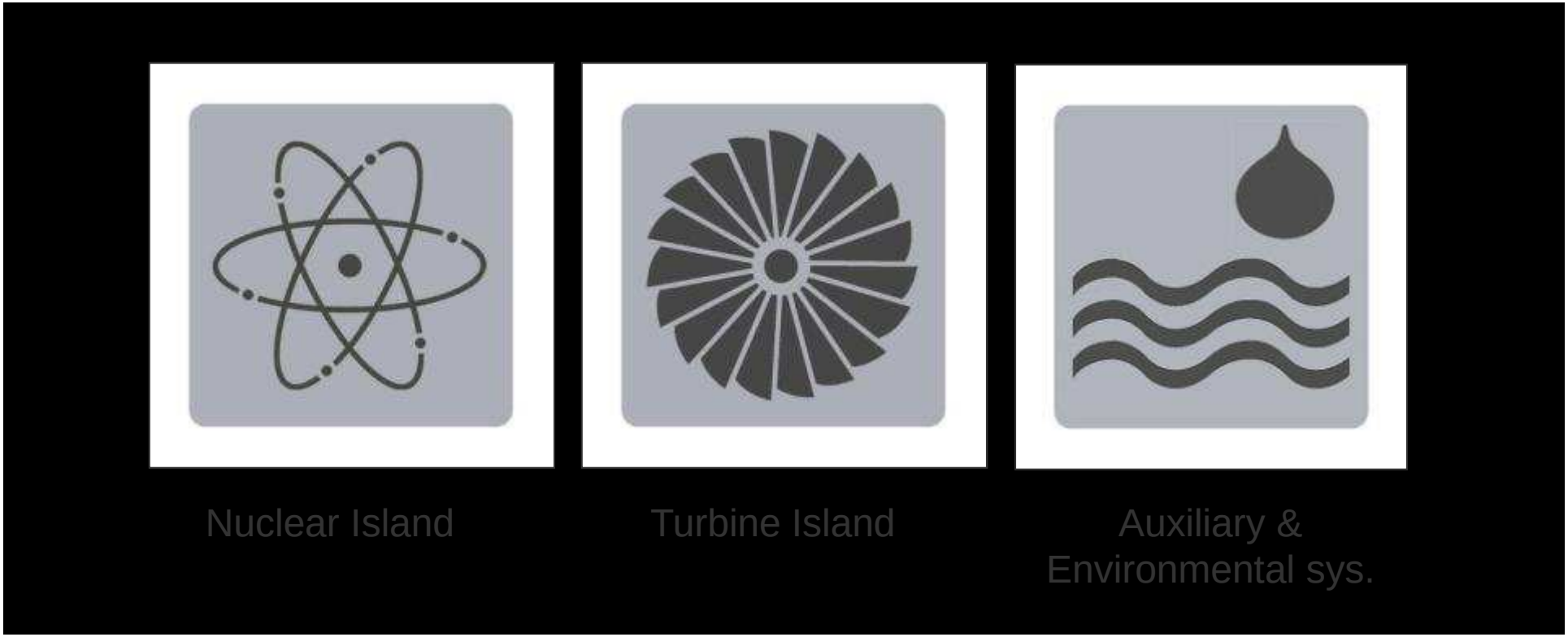
* Plus a number of minor production and assembling units

Key technologies

Our key technologies are adapted to each customer segment and offered separately or combined into optimized solutions.



Alfa Laval in the nuclear industry



Alfa Laval's proven record

- 50 years of experience in the Nuclear field
- More than 3000 Alfa Laval plate heat exchangers installed in Nuclear power plants worldwide
- Alfa Laval has competence to design, manufacture and test to ASME, RCC-M, PNAEG, HAF604, YVL and other codes and standards



Air Heat Exchangers in Nuclear Power Plant

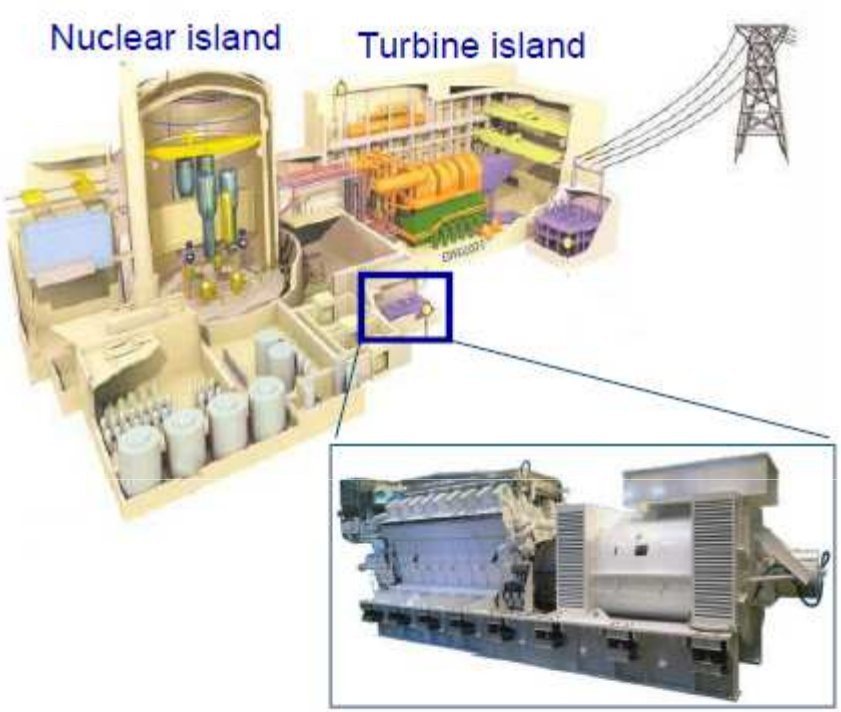
Tereza Kucera MU Power

Agenda

- Diesel Generators in Nuclear Power Plants
- Alfa Laval Solution for Nuclear Power Plants
- Why Alfa Laval AHE

Diesel Generators in Nuclear Power Plants

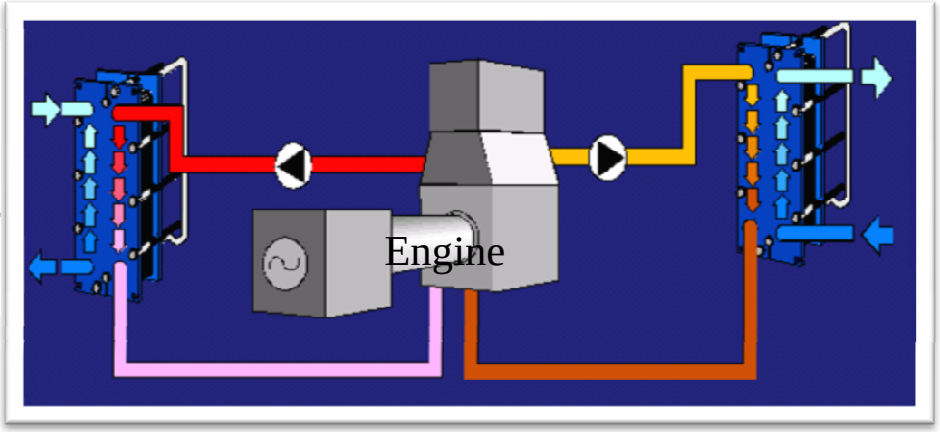
What is EDG cooling



- Emergency Diesel Generator (EDG)
  - Power supply for safe nuclear reactor shutdown
  - 2 to 4 EDG per reactor
  - 2 to 10 MW / 6 to 10 kV
- Swing Diesel Generator (SDG)
  - Backup during EDG maintenance
  - Generally 1 SDG per plant
  - 2 to 10 MW / 6 to 10 kV
- Station Black-Out Generator (SBO)
  - Low-voltage emergency power
  - 0 to 2 SBO per reactor
  - 0.5 to 3 MW / 400 to 700 V

What is EDG cooling

Working principle



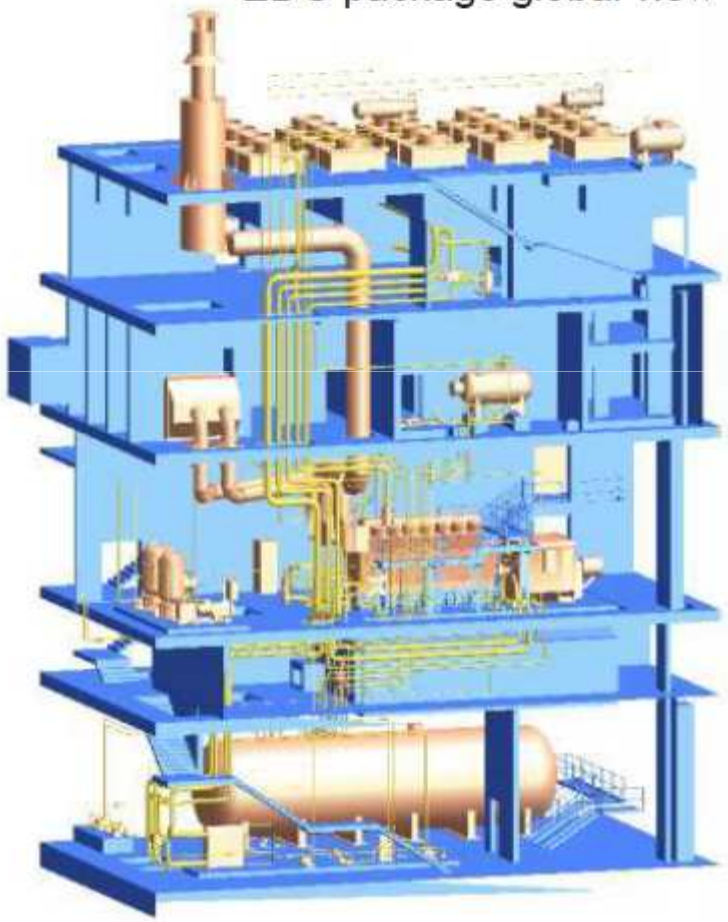
HT (high temperature circuit): to cool jacket water

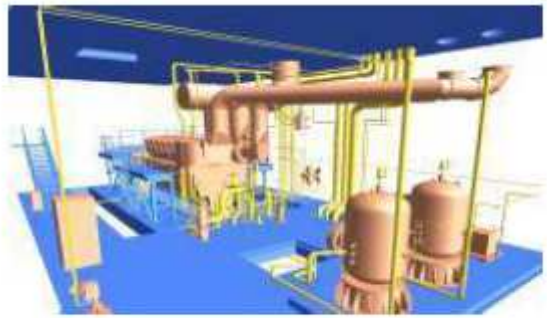
LT (low temperature circuit): to cool lubrificating oil and turbo

Why Air Cooled EDG

Completely independent solution

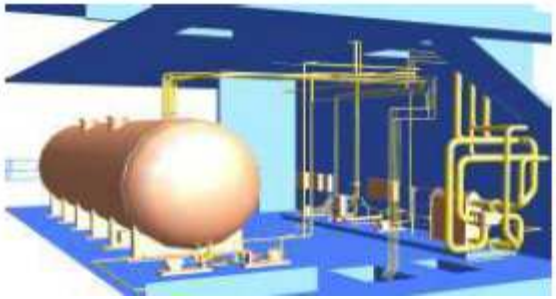
EDG package global view





+ 0 m
view 1

+ 0 m
view 2

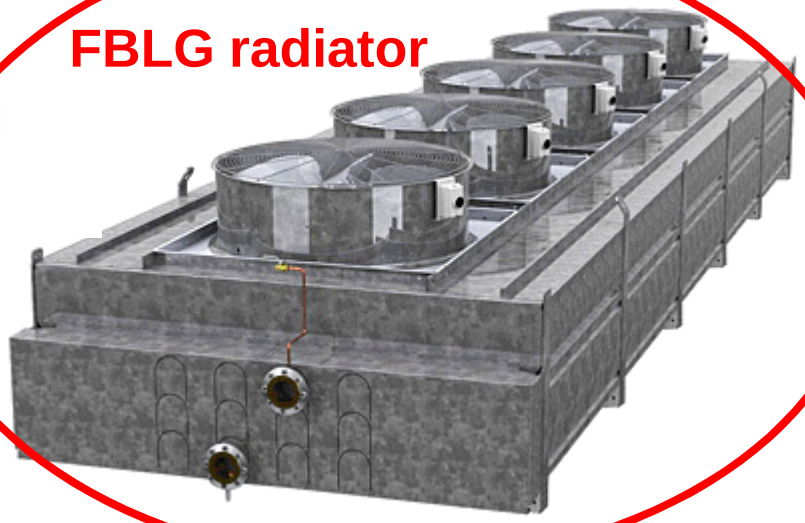


- 11.3 m
view 3

Alfa Laval Solution for Nuclear Power Plants

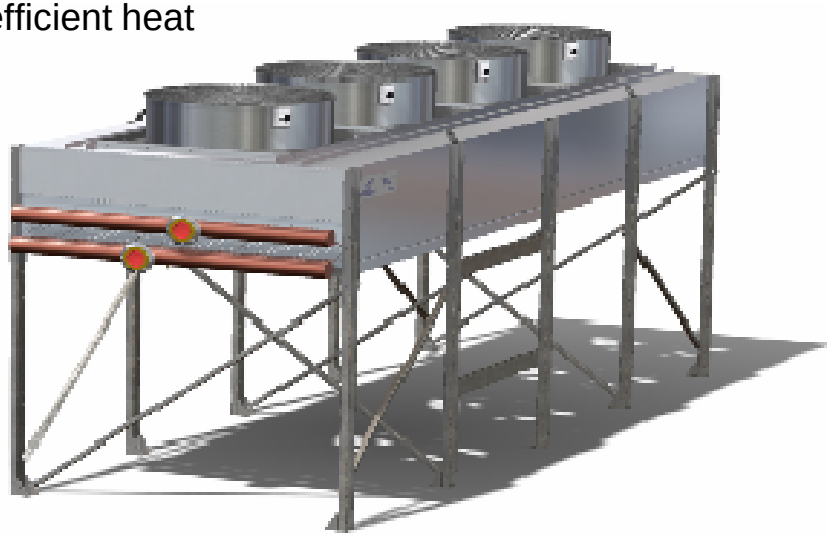
Main Products for Power industry

FBLG radiator

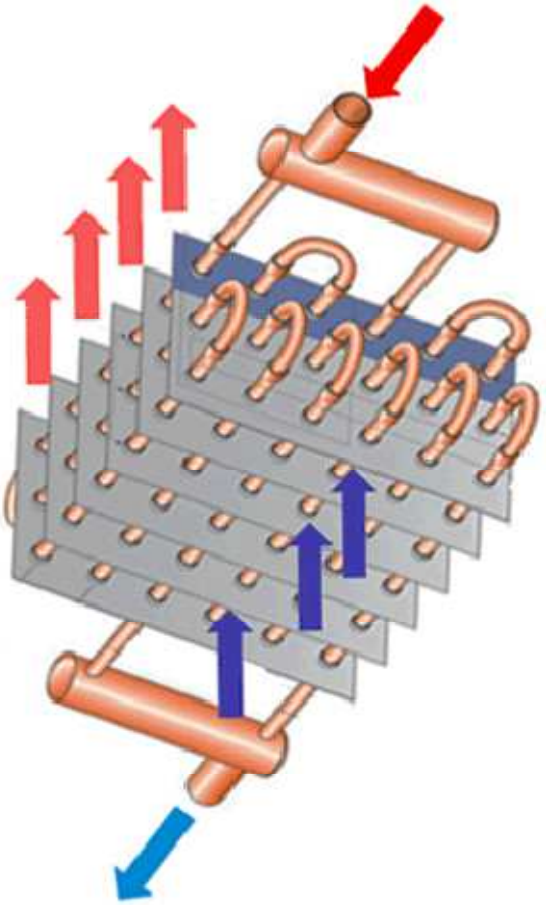


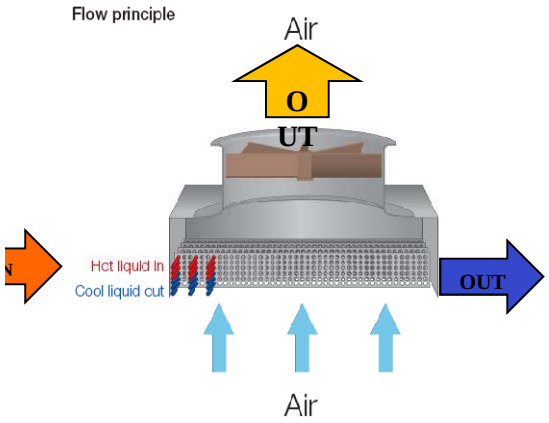
FBLG Radiators in summary

- Coil technology for lighter installation, less footprint and efficient heat transfer
- Designed for multiple installations
- Custom designed sizes to each project
- Factory tested plug&play units
- One or two circuit units for HT and LT
- Ø1240 mm fans
- Max 7 pcs 1.2m fans
- Robust construction, no service platform needed
- Seaworthy packing or container transport on wooden flat
- Designed according to PED or ASME

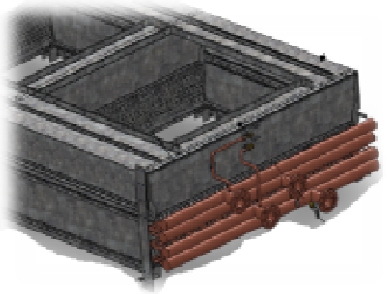


FBLG working principle

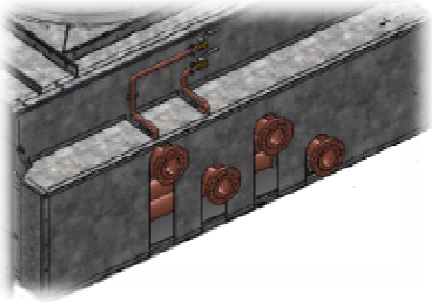




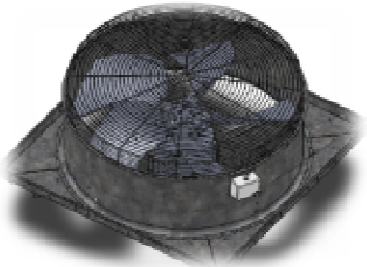
FBLG characteristics



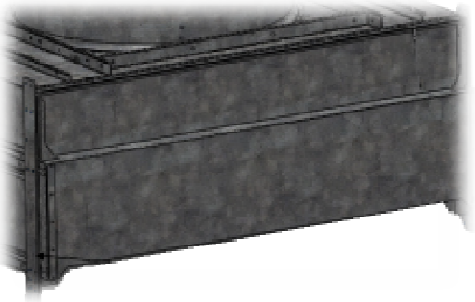
Partitions between fans to avoid air by-pass and to regulate the cooler capacity by means of separate use of the fans.



Front header tube protection panels.



Alfa Laval fan-motor package;
Our own design !



Back bended tubes protection panels.

Venting and draining valves.

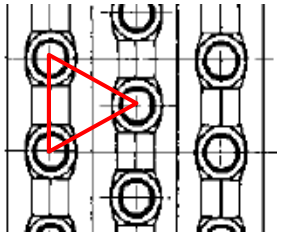
SS tubes and openable header box solution when required

All casing parts are of hot dip galvanized steel plates with customized paining possible.

Tubes / Fins

Coil construction - Tubes

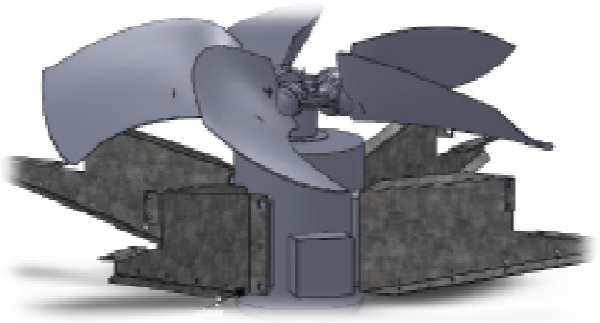
- Triangular Geometry
- Copper tube or Stainless steel tubes (SS 304 or 316L)
- OD 12 and 16mm
- WT 0,5mm



Coil construction - Fins

- Aluminium (std): 0.18 mm thickness, spacing 2,3~4 mm
- Alternative fin materials/treatments
  - Seaworthy aluminium AlMg 2.5
  - Epoxy coated aluminium
  - Copper
  - Cu (fin + tube)
  - F-Coat and Blygold Treatments

Fan & Motor

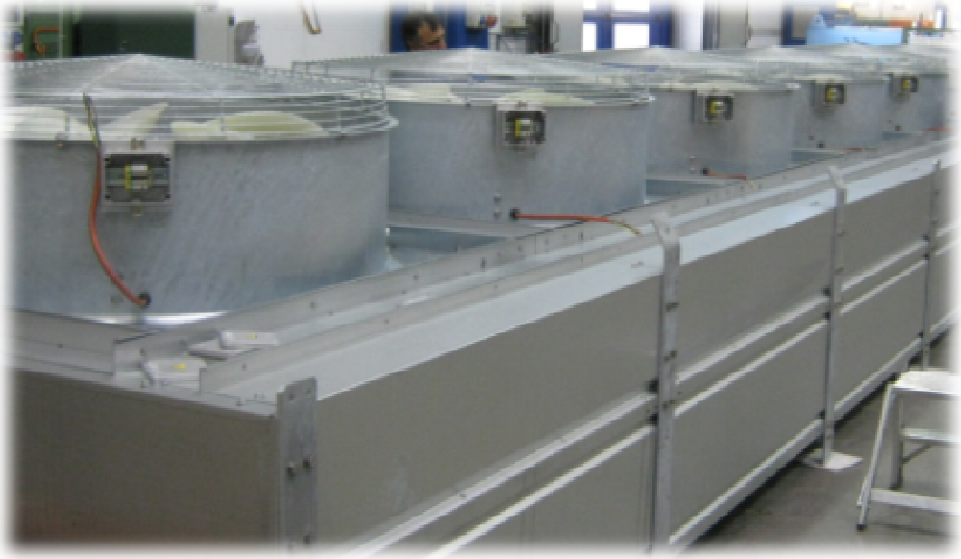


Electric Motor	The motors are squirrel-cage motors for outdoor use built to IEC standards and provided with condensing water outlets and shaft seals together with H-class insulation. Maximum 7 per unit. Each electric motor is wired to its on/off lockable switch; Available for various power supplies
Fan Propellers	Direct driven axial fans Glass Reinforced Polyamide (PAG) or Aluminium Fan Diameter: 1.25m or 2m The HDG metal protection grid is included
Electric motor options	- Tropical treatment on rotor and stator - Space heaters - Ex proof design - Different standards (RCCE, NEMA,…)
Control options	- Fan speed control, step control or frequency control - Common terminal box located in the end of radiator

FBLG – Feet, Ladder, Handrails

Mounting Legs	Height From 2 to 5m Finishing in HDG Delivered dismounted as loose parts Designes according to Eurocode (considering Site conditions: Wind load, Earthquake Zone, snow load, etc)
Handrails	Finishing in HDG Delivered dismounted as loose parts
Ladder	From 2 to 6m Finishing in HDG Delivered dismounted as loose part (completely welded)

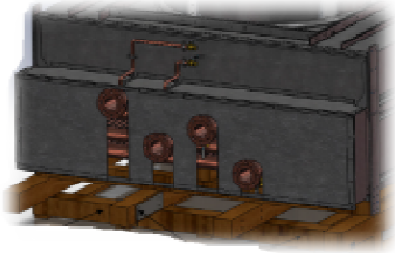
Pictures



Transportation

Using

standard 40'/45’ container



in wooden seaworthy packing

Suitable for truck transportation

Documentation

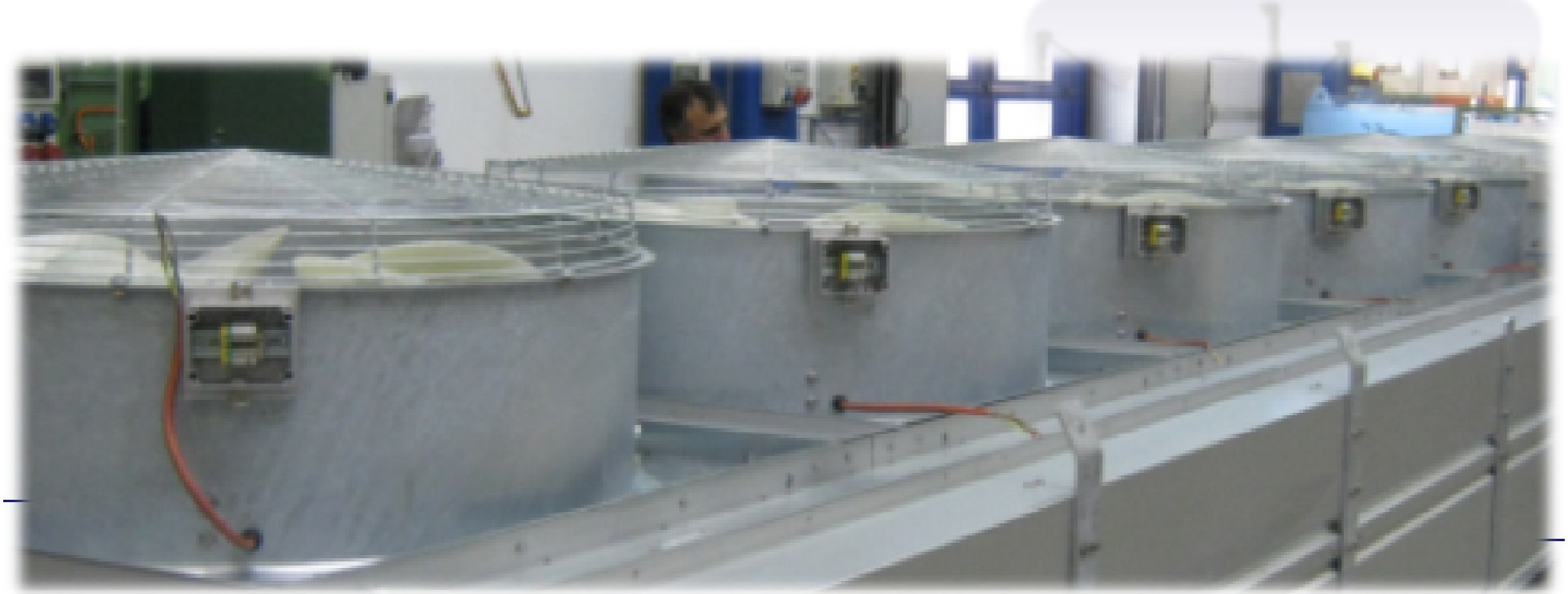
Extensive product & project documentation can be supplied

- Customized Drawings
- Manufacturing Schedule and Monthly Reports
- Seismic and other loads calculation
- Material Certificates and traceability
- Quality Assurance program
- Manufacturing procedures
- Welding procedures
- Customized quality control plan (QCP)
- NDE
- Installation, operation & maintenance manuals
- Test reports:
  air pressure or water pressure; fan-motor (rotation direction, Ampere, electrical continuity); Fan vibration level; air flow; noise measurements; tube cleaning; painting thickness; complete package assembling; NDE etc.

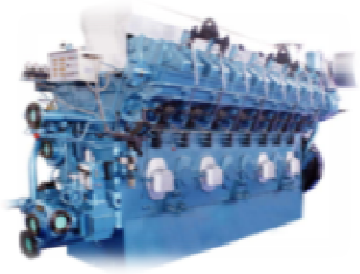
Why Alfa Laval Air Heat Exchanger

Alfa Laval has

- Proven 50 years reference list and track record in different nuclear applications and with different products
- Experience sales force, product and application management to find the perfect match between the specified and offered solution



Alfa Laval is a market leader in supplying radiators to middle speed engines



- Projects with 20 years experience
- More than 1 000 power plants and >5000 big dry coolers

Engine builders

Rolls-Royce, WÄRTSILÄ, Cummins, CATERPILLAR, MAN

Engine Power Contractors

F.G. WILSON, BWSC, CLARKE GROUP, FINNING CAT, FRERK AGGREGATEBAU GMBH