Railway, Tramway & Subway

Application Collection

Air conditioning and
fluid thermoregulation systems
dedicated to railway vehicles

AC GRAF
Thermodynamic Equipment & Industrial Refrigeration

www.acgraf.it

Railway, Tramway & Subway, AC GRAF for the Railway Sector

ACTIVITIES

The AC GRAF company works in the railway area as air conditioning supplier, and it focuses also on processes of fluids thermoregulation systems and technical compartments cooling.

The experience gained over the years allowed us to cover a broad range of this area, through onboard electrical panels cooling to large integrated cooling systems and for processes of fluid thermoregulation, all necessary to allow the well-functioning of diagnostic and operative equipment.

PROJECT MANAGEMENT

Thanks to the acquired experience, to versatility and to the management systems, Ac Graf assists the customers from the design idea, its development, production and after sales assistance.

The phase-control is projected according to the guidelines provided by ISO 9001 norms and take advantage by design and fabrication technologies.

Our company is able to handle commissions from anywhere in the world, adapting to local standards.

CLIENT-CENTRIC SOLUTIONS

The Ac Graf company has always placed customers needs and requirements at the centre of its mission.

We autonomously work on several fronts:

- Built on demand: fabricated systems based entirely on client's design.

- Co-design – engineered and fabricated systems on client's technical specifications with customized aim.

- Problem solving: the systems are designed and built on specific customer needs, starting from the supply technical documentation to the finish product delivery.

Our workability can be characterized by single product realization or series, managing every detail with a particular code.

All the Ac Graf staff is completely involved with customers relations, from the design, production to functional tests.

Each supply is always equipped by data sheets of components, language required instruction manual and recommended spare parts list.

Our main interest is the customer follow up in all the after sale stage and for every future project necessity of revision or change.

READY TO FACE NEW CHALLENGES

In the following Application Collection we want to present Ac Graf's production system potentials with a selection of our latest works, looking forward to new challenges.

Tropicalised Underbody Cooler

Side panel fan overall view, suspension upper system on rail.

SCROLL compressors and fluidic circuits.

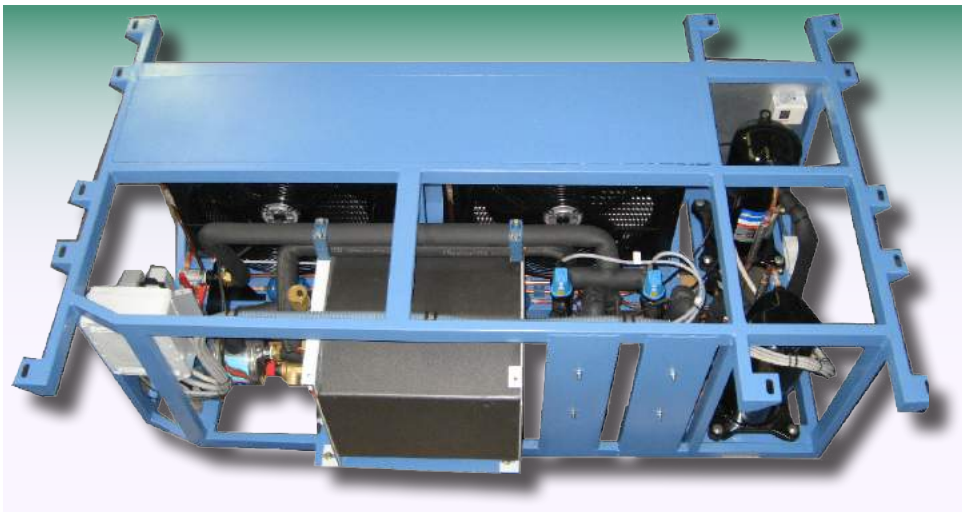
Electrical Panel integrated with
TEMPERAURE CONTROLLER.

Technical specifications:

- Cooling capacity 35 kw with setting temperature at 60°C.
- Four axial electric fans controlled by pressure switch relieves for condensation control.
- Chilled Fluid temperature (IN-OUT) 12-7 °C.
- Double cooling circuit, two hermetic SCROLL R134 compressors, two brazed stainless steel plate heat exchangers.
- Hydraulic circuit including tank and pump with 7000l/h capacity and 1 bar prevalence.
- Electrical remote controlled panel with electric temperature controller, status indicators and SOFT START system for the slow compressors start-up. Power supply 380V.
- Solid structure made by steel boxes and aluminium panels.
- Engineered according to legislation.
- Work area: North Africa.

UNDERBODY COOLERS THAT MAY BE COVERED FROM 7 TO 16 kW

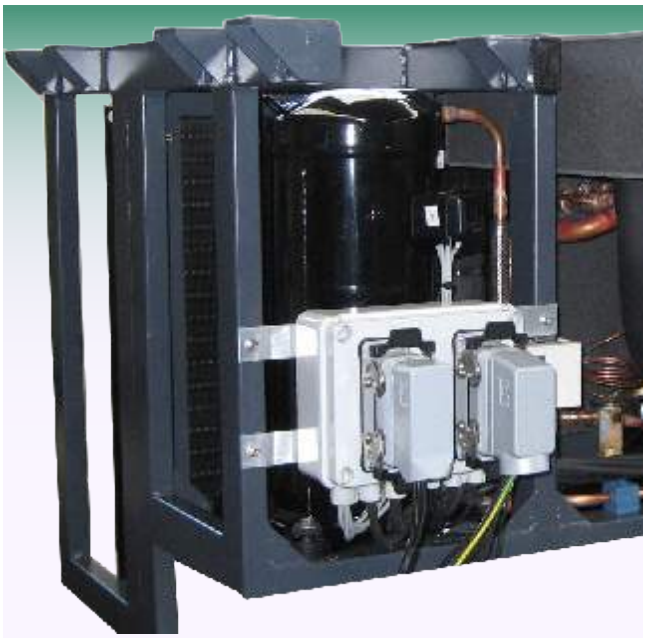
16 kW double circuit cooler.



Rack 19”
Standard electrical panel.

10 kW mono compressor cooler

Electrical power connection details and signals with **quick connectors**



Technical specifications:

- Cooling capacity from 10 to 16 kw with setting temperature at 45 °C.
- Two axial electric fans commanded by pressure switch relieves for condensation control.
- Chilled Fluid temperature (IN-OUT) 12-7 °C.
- Single or double cooling circuit, one or two hermetic SCROLL R407C compressors, brazed stainless steel plate heat exchangers.
- Hydraulic circuit including stainless steel tank and pump.
- Electrical remote controlled standard panel Rack 19’’ with quick connections, electronic temperature controller and SOFT START system for the slow compressors start-up. Power supply 220 and 380V.
- Solid structure made by steel boxes.
- Engineered according to legislation.
- Area operativa: Europa.

Underbody Coolers

8kW cooler, electrical panel and fans side.

Pump and compressor side view

Technical specifications:

- Two axial fans commanded by pressure switch relieves for condensation control.
- Single or double cooling circuit, hermetic SCROLL R407C compressor, brazed stainless steel plate heat exchangers.
- Hydraulic circuit including stainless steel tank and pump.
- Electrical remote controlled panel with quick connections, electric temperature controller and SOFT START system for the slow compressors start-up. Power supply 380V.
- Solid structure made by steel boxes.
- Engineered according to legislation.
- Work area: Europe.

Underbody Cooler

7kW cooler fans side

Electrical and hydraulic connection side view

Technical specifications:

- Two axial fans commanded by pressure switch relieves for condensation control.
- Single or double cooling circuit, hermetic SCROLL R134A compressor, brazed stainless steel plate heat exchangers.
- Hydraulic circuit including stainless steel tank and pump.
- Electrical remote controlled panel with quick connections, electric temperature controller and SOFT START system for the slow compressors start-up. Power supply 380V.
- Solid structure made by steel boxes
- Engineered according to legislation.
- Work area: Australia.

Packaged Coolers

Packaged underbody cooler

Hydraulic connections view

Train body cooler for **maintenance vehicles**

Centrifugal fans cooling

Technical specifications:

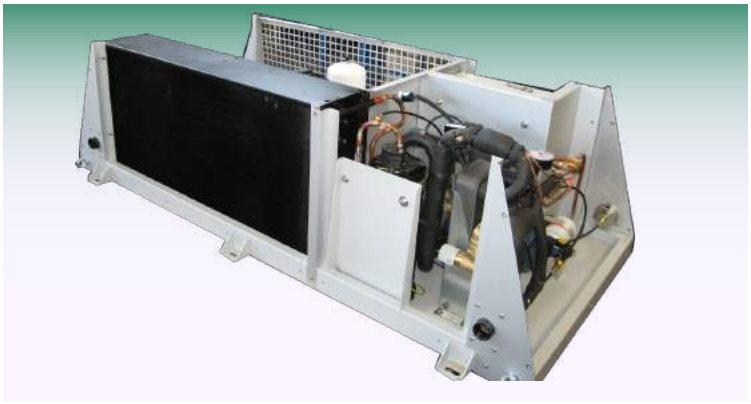
- Cooling capacity from 2 to 15 kw with setting temperature at 45 °C.
- Axial fans commanded by pressure switch relieves for condensation control.
- Chilled Fluid temperature variable from 5 to 20°C.
- Single or double cooling circuit, one or two hermetic SCROLL or Rotary compressors, brazed stainless steel plate heat exchangers.
- Exposed Refrigerant gauges.
- Hydraulic circuit including stainless steel tank and pump.
- Electrical panel on board or with remote control, and SOFT START system for the slow compressors start-up. Power supply 220 and 380V.
- Solid base structure made by steel and aluminium panels.
- Engineered according to legislation.

Roof Mounted Coolers

"Aerodynamic" roof mounted packaged cooler

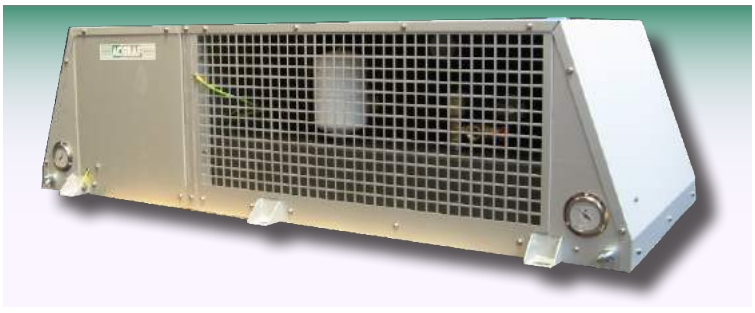
"Compact" roof mounted cooler

Component's Lay-out



Component's Lay-out

Roof mounted **air diffusion groups**



Roof mounted **air diffusion groups**

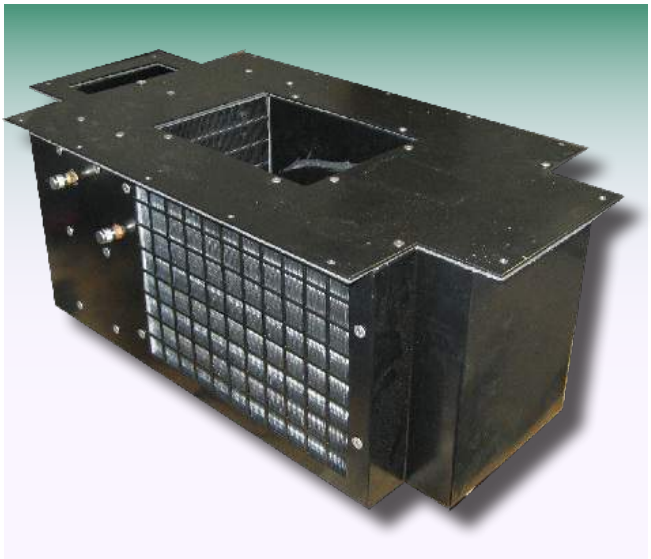
Technical specifications:

- Cooling capacity from 3 to 8 kw with setting temperature at 45°C.
- Axial fans commanded by pressure switch relieves for condensation control.
- Chilled Fluid temperature variable from 5 to 20°C.
- Single or double cooling circuit, one or two hermetic SCROLL or Rotary compressors, brazed stainless steel plate heat exchangers.
- Exposed Refrigerant gauges.
- Hydraulic circuit including stainless steel tank and pump.
- Electrical panel on board or with remote control, electronic temperature controller and SOFT START system for the slow compressors start-up. Power supply 220 and 380V.
- Solid base structure made by steel and aluminium panels.
- Engineered according to legislation.

Direct Expansion Monoblocs for cabinets

Top supply and return monobloc, remote temperature controller, fans side

Top supply and return monobloc, remote temperature controller, condenser side



Top supply and return monobloc, on board temperature controller, fans side

Top supply and return monobloc, on board temperature controller, condenser side

Technical specifications:

- Cooling capacity from 200 to 1500 W with setting temperature at 45 °C.
- Axial fans controlledd by pressure switch relieves for condensation control.
- Ultra compact construction
- Single cooling circuit, hermetic rotary vertical or horizontal compressor.
- Automatic condensate drain.
- Supply and return air-flow located according necessities.
- Electrical panel onboard, temperature controller placed or remote. Power supply 220V.
- Solid structure made by steel sheet panels.
- Engineered according to legislation.
- Ideal for electrical panels or cabinets containing electrical components cooling.

Standard Rack Cabinets Cooling Systems

Standard **rack cabinet** automating cooling unit, front side

Standard **rack cabinet** automating cooling unit, rear view

Water fan coil unit for rack cabinet cooling, frontal view.

Water fan coil unit for rack cabinet cooling, rear view.

Technical specifications:

- Cooling capacity from 1000 to 2500 W with setting temperature at 45 °C.
- Axial fans controlled by pressure switch relieves for condensation control.
- Ultra compact construction realized according to Rack standards. (h from 3 to 6U).
- Single cooling circuit, hermetic rotary vertical or horizontal compressor.
- Automatic condensate drain
- Supply and return air-flow located according necessities.
- Solid structure made by steel sheet panels.
- Engineered according to legislation•
- Ideal for electrical panels or cabinets containing electrical components cooling.

Integrated Systems

Air conditioning and chilled water manufacturing group for technical purposes

Control panel

Maintenance access on veichle

Technical specifications:

• Integrated system for air conditioning and chilled water production for onboard devices cooling.

•Axial fans controlled by pressure switch relieves for condensation control.

• Single or double cooling circuit, hermetic horizontal SCROLL compressors, brazed stainless steel plate heat exchangers.

• Electrical remote controlled panel, SOFT START system for the slow compressors start-up. PLC system management. Power supply 380V. Air treatment brushless fans 24V.

• Heating air system through water exchanger.

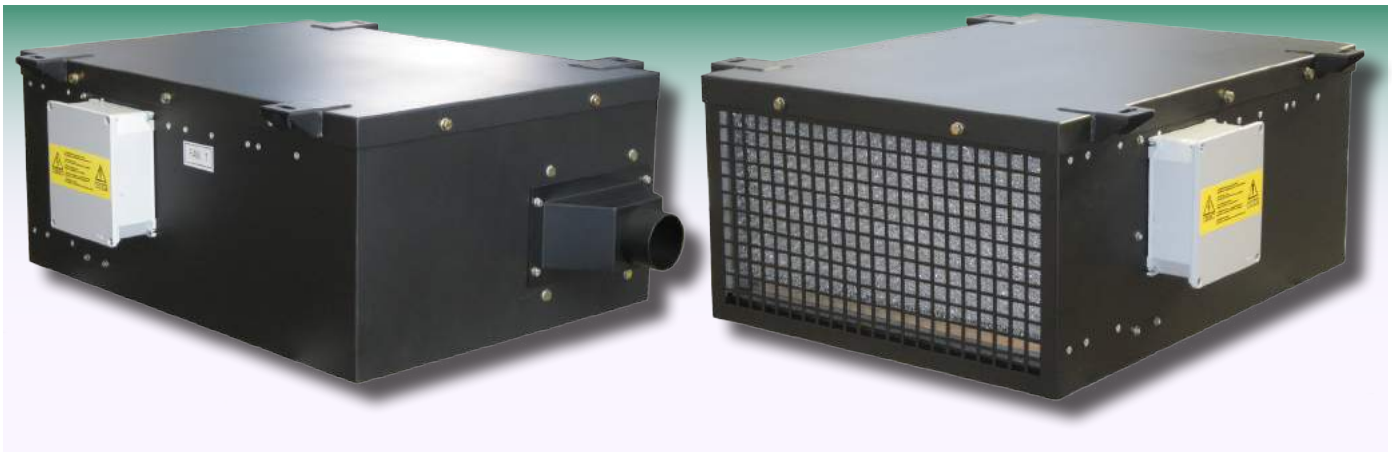
• Solid structure made by welded aluminum boxes.

• Engineered according to legislation.

• Work area: Europe.

Fan Heaters

Undercover hot air blowing system avoiding condensation



Detachable control panel

Technical specifications:

- Measurement laser glass hot air blowing system avoiding condensation.
- Resistance heating.
- Fan overload protection.
- Power supply 110 V / 60 Hz or 230 V / 50 Hz.
- Solid structure made by welded steel boxes.
- Engineered according to legislation.
- Heat output 4,5 kW.
- Nominal input capacity 23
- Fan flow rate: 750 m^3/h
- Fan pressure: 2300 Pa
- Operating range: -20 ÷ +60°C

***Data concerning 230V/50 Hz variation**

- Work area: Europe/North Africa

Retrofit

Retrofit and strengthening on technical fluid cooling systems.

Madrid Metro

Work area: Europe

Company References

We've inserted this page because we firmly believe that quality and capacity have to be proofed.
We showed you few special applications produced for some of our most important customers of the railway area.
Ac Graf developed custom-tailored solutions to catch great challenges, creating the Raliway, Tramway and Subway Line, always ready to face new and various requests.

We worked for:

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"THE BITTERNESS OF POOR QUALITY REMAINS LONG AFTER THE SWEETNESS OF LOW PRICE IS FORGOTTEN."

-Benjamin Franklin-

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