



ENVIRONMENTAL  
CLIMATE CONTROL  
EQUIPMENT & SOLUTIONS



# AERONAUTICS



[www.ett-hvac.com](http://www.ett-hvac.com)



# High Quality Air conditioning equipment ETT, the air handling expert

Energie Transfert Thermique is a 100% French company, located on the Brittany coast, which has been designing and manufacturing high performance thermal units for nearly 1979 years.

With 330 employees, the company has based its growth on continuous innovation, the quality of its machines and Customer Service.

For many years, **ETT** has worked in partnership with some of the biggest names in the aerospace industry to design, develop and supply equipment to meet their requirements.

## Low-carbon economy, Durability, Recyclability

**ETT** is committed to an **eco-design** approach aimed at reducing the environmental impact of all its units, from their design to their dismantling.

All structures are made of **aluminium** (100% recyclable), without the use of paint or solvents.

The refrigerants used have no impact on the ozone layer and have a **very low** 'Global Warming Potential'.

The machines are designed to last over time and to maximise their maintainability.

The energy performance (**SEER** and **SCOP**) is consistently among the best on the market.

In accordance with the French Environmental Code, **ETT** has signed up to the collection and recycling of its end-of-life units.

## ETT and Aeronautics, an enduring connection

**1979**

Creation of **Energie Transfert Thermique**

**1988**

1st equipped airport: **Bordeaux-Mérignac** (33) - France

**1991**

1st aeronautical equipment manufacturer delivered:  
**Turbomeca** now **Safran Helicopter Engines** (Bordes-64) - France

**1999**

**AFAQ ISO 9001** certification

**2000**

1st equipped air base: **123 Orléans-Bricy** (45) - France

**2002**

1st **ACU** manufactured for **EADS SOGERMA** (33) - France

**2008**

1st **ACU** supplied to **AIRBUS** (Cormebarrieu-31) - France

**2010**

**AFAQ ISO 14001** certification

**2012**

Construction of an **ETT climatic chamber** for unit testing under real conditions

**2013**

1st **ACU** supplied to **DASSAULT AVIATION** (Mérignac-33) - France

**2014**

1st **ACU** supplied to **ATR** (Colomiers-31) - France

**2020**

**CSR** approach launch

**2023**

Release of the newest generation of **ETT ACUs**

# Solutions adapted TO EACH stakeholder IN THE Aeronautical Market

ETT's industrial facilities enable it to meet all the aerodynamic and thermal requirements of the aeronautical market.

ETT offers its own range of **ACUs** for aircraft under construction, maintenance and ground handling, as well as a wide range of machines dedicated to the **comfort** of airport buildings and the smooth operation of the **industrial processes** of aeronautical equipment manufacturers.



# Bespoke units THAT MEET the industrial processes requirements.

The various parts of an aircraft and all of its components require industrial manufacturing processes that are often very high-tech.



Manufacturing halls require high capacity air handling systems that are appropriate to their volume, (due to the large loads generated) and capable of ensuring the indoor air quality required for the comfort of personnel and the proper operation of machinery.



*FAU treatment unit for sections, cockpits and wing ventilation*

**ETT** designs and manufactures a number of machines for machining areas (fuselage panels, rotors, casings, gears, etc.), sheet metal work, boilermaking, precision mechanics and assembly, all of which are dedicated to aeronautical construction: ventilation and air extraction filter boxes, compact heating and air-conditioning equipment, high-power hot and chilled water production, etc.

## Some French manufacturers equipped

- **Airbus Group** : Airbus Helicopters (13), Airbus sas (31), Airbus Atlantic (44) and Stelia Aerospace (44).
- **Collins Aerospace Group** : Goodrich Aerospace (31 & 77) et Ratier Figeac (46).
- **Dassault Aviation Group** : Mérignac (33) and Seclin (59).
- **Figeac Aero Group** : Figeac (46)
- **Lisi Aerospace Group** : Villefranche de Rouergue (12) and Marmande (47).
- **SAFRAN Group** : ex-SNECMA (27, 71, 77, 86, 91 & 92), ex-Turboméca (64), ex-Aerazur (16 & 37), ex-Messier-Bugatti-Dowty (67), ex-Hispano Suiza (92)...

Workshops with emissions of dust, welding fumes or polluting vapours such as solvents (surface treatment, painting areas, degreasing, etc.) must be equipped with extraction systems (possibly **ATEX**) and fresh air introduction systems sized on a case-by-case basis.



*Air conditioning and ventilation unit for aircrafts assembled in FAL*



*Dissipation bench*

For areas such as "Prototype Settings", test benches, or even clean rooms (electronics), the air handling equipments have a very specific level of filtration and regulation of climatic parameters. Here too, **ETT's** Engineering & Design Department knows how to study each case in order to provide the most appropriate solution for its clients.

Aircraft maintenance facilities (**MRO**), whether for passenger transport or the military, also require particularly robust and reliable units.



## ETT also supplies French military sites

- **Centre DGA Techniques aéronautiques** (French Directorate of Armaments) : Balma (31)
- **Air force base 106** : Mérignac (33)
- **Air force base 120** : Cazaux (33)
- **Air force base 123** : Orléans-Bricy (45)
- **AIA Bretagne** : Lann Bihoué (56)...

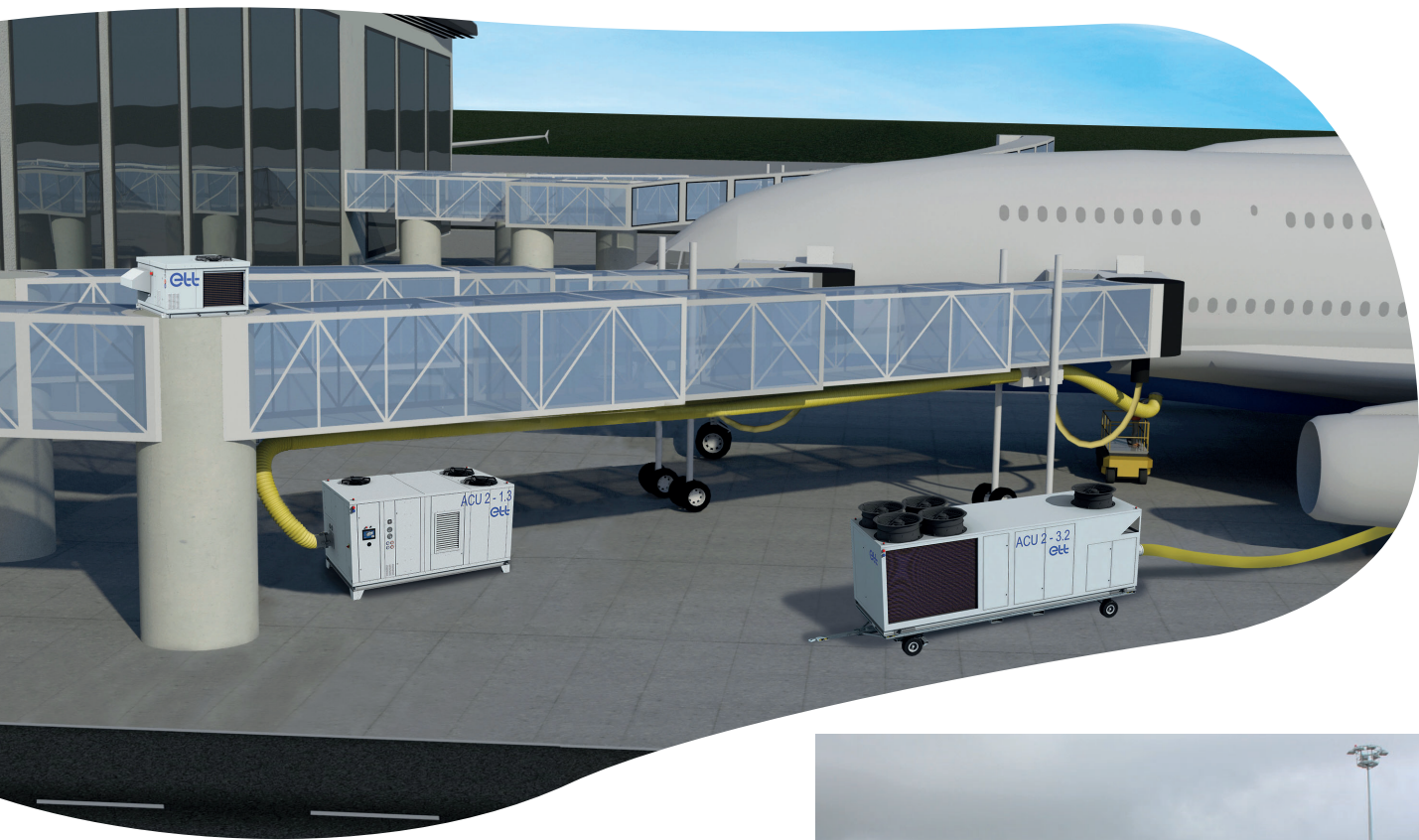
# ETT, designer & manufacturer of a range of French Acu



Since 2008, **ETT** has chosen to develop a range of **ACUs** (Air Conditioning Units) to maintain the temperature of technical and passenger areas of aircrafts when they are on the ground.

## The environmental solution to « APU-OFF »

Airports should move towards the « APU-OFF » solution as part of their **Decarbonisation** approach. **ACUs** (also known as PCAs) are perfect substitutes for APUs since their 100% electric thermodynamic operation eliminates the CO<sub>2</sub> and NOx emissions generated in significant quantities during stopovers in "APU-ON" mode.



## Some equipped sites

- **Airbus SAS** : Toulouse (31), Hambourg, Seville, Madrid and Tianjin sites (almost 150 ACUs supplied since 2008).
- **Dassault Aviation** : Mérignac (33) and Istres (13) sites.
- **AIRBUS ATR** : Colomiers (31).
- **9ème BSAM** (French Air Mobile Support Battalion) : Maintenance of military helicopters – Montauban (82).
- **5ème RHC** : (French Combat Helicopter regiment) : Combat helicopters - Pau (64)

In 2023, **ETT** launched a brand new range of **ACUs** in full compliance with the diversity of its customers' requirements.

Type	Aircraft categories according to			Supply air flow rate (kg/s)	Pressure available (mBar)	Cooling capacity *(Tons)	Cooling capacity* (kW)	Supply air Temperature (°C)
	RECAT-EU	DGSE (French Directorate General for External Security)	ICAO					
ACU8 0.5	Light weight	A/B	L	0.5 to 0.9	40	4.8	17.0	8 to 12 °C
ACU2 0.9	Light weight	A/B/C	L	0.6 to 0.9	65	16.2	56.8	2.0°C
ACU2 1.3	Medium weight	B/C	L-M	0.9 to 1.3	55	23.2	81.6	2.0°C
ACU2 2.5	Medium weight Wide-body aircraft	C/D/E	M-H	1.5 to 2.5	75	46.2	162.3	2.0°C
ACU2 3.2	Wide-body aircraft Super jumbo jet	C/D/E/F	H	1.3 to 4.2	100	66.7	231.0	2.0°C

(\* ) at max supply air flow rate and outdoor conditions 35 °C / 40 % RH - Data at nominal supply air flow rate of 3.2 kg / s for the ACU2 3.2 unit

Sizes 0.9 to 3.2 have been specifically developed for **airport** applications as they can supply air continuously at +2°C to 35°C/40% outside **without defrosting**. The units in the ACU2 range have been designed to provide **supply air conditions at 2.0°C up to an outside temperature of +45°C, or even +50°C** (100kJ/kg ) for the ACU2 3.2. unit.

These performances are those required to maintain the cockpit and the passenger cabin at a comfortable temperature, but also to ensure the ventilation and cooling of the avionics bay in "APU-OFF" mode.



For **FAL (Final Assembly Line)** or **MRO (Maintenance, Repair & Overhaul)** applications, versions that blow at +8°C are preferred.



# Our solutions FOR air treatment FOR airports

Airports are now part of a global approach to **Sustainable development** and **Decarbonation** and air treatment can make significant contribution to this.

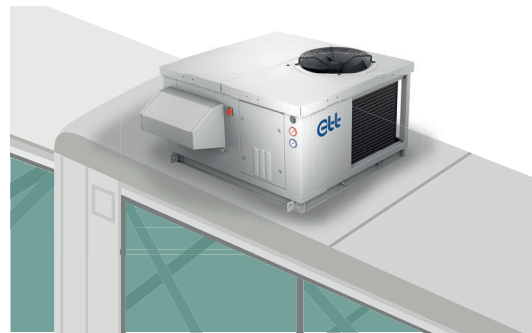
**ETT** offers a wide range of **high-efficiency** thermal machines (heat pumps) to ventilate, heat and air-condition the various areas of airports in a virtuous way, as well as to produce hot and cold water **simultaneously** (heat pumps) for thermal installations using water as a heat transfer fluid.

Whatever the level of comfort required in the different areas of the terminals (Check-in halls, screening stations, boarding halls, access bridges or baggage claim **eco-responsible** aérothermal and geothermal solutions exist.



## ULTIMA

Rooftop for heating & cooling of the terminal halls



## RTS

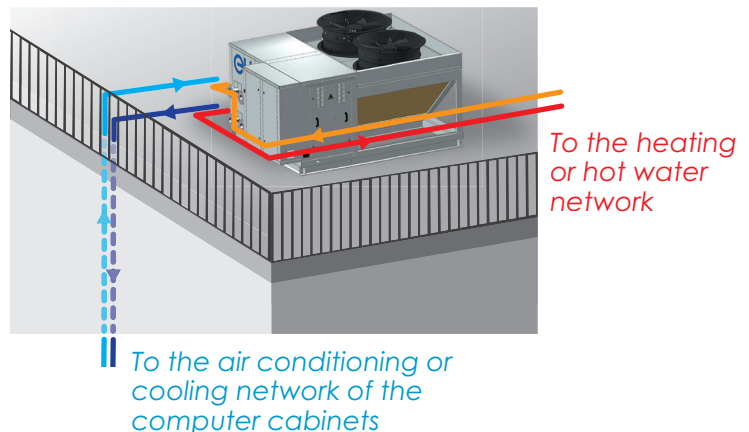
Boarding bridge comfort unit

## Some equipped airports in France

- Deauville-Normandie (14)
- Brive-Souillac (19)
- Bordeaux-Mérignac (33)
- Montpellier-Méditerranée (34)
- Nantes-Atlantique (44)
- Metz-Nancy-Lorraine (57)
- Paris-Orly (94)
- Paris-Charles de Gaulle (95)
- Guadeloupe-Pôle Caraïbes (97)...

## ECO4

Simultaneous production of hot and cold water



Just like the perceived temperature, **Indoor Air Quality** is an integral part of human comfort criteria. Specifically designed air handling equipment with **several levels of particle filtration** ensure this **IAQ**. And for areas close to the tarmacs, **ETT** can supply units with **molecular filtration** to work against the gaseous pollutants emitted by aircraft engines (NO<sub>x</sub>, VOCs, SO<sub>2</sub> smelling kerosene, etc.)



A major development in this new range is the replacement of **R410A** refrigerant with **R513A**, which has the advantage of having one of the lowest GWP of non-toxic and non-flammable fluids.

Refrigerant	R404A	R410A	R407C	R134a	R32	R513A	R290	CO <sub>2</sub>
GWP (tCO <sub>2</sub> eq)	3922	2088	1774	1430	675	631	3	1


**GWP=Global Warming Potential**

In French, Global Warming Potential of a fluid compared to that of the same mass of CO<sub>2</sub>.


Choice of ETT  
for the aerospace sector

**ACU new range overview**

**Accessories (OPTION)**  
Standard or customised ventilation ducts



- Aircraft PCA connections




**AG3 aluminium frame and casing assembly**

20-year guarantee against corrosion frame - casing

**External fans**  
Variable speed, communicating, electronically commutated "EC" motors, optimal efficiency and low noise level

**External condensers**  
with vinyl protection

**Air duct connections and electrical**  
Connector for circular ducts  
Power supply cable reel  
**Duct storage tray (OPTIONAL)**

**Double filtration level at the fresh air intake**  
ISO Coarse 65% (**G4**)+ISO ePM1 50% (**F7**) 98mm thick  
Easy maintenance, accessible via hinged panel

**Evaporator housing with condensate drain**  
Evaporator with hydrophilic coating  
Double ball siphon with no air leakage

**Supply air fans+ variable-speed unit**  
With constant pressure holding

**Electrical compartment**  
Latest generation of PLC

**Unit delivered (OPTIONAL)**  
- On legs  
- On mobile trailer

**Auxiliary heating compartment (OPTIONAL)**  
Electric heaters + Triac

**2 circuits equipped with semi-hermetic piston compressors**  
Equipped with the latest generation of mechanical power regulators  
Refrigeration circuit with electronic expansion valves

**Touch screen (OPTIONAL)**

**myETTVision (OPTIONAL)**  
Remote control and monitoring system for the operation and energy consumption of the units



# THE **ETT strength** IS ALSO IN ITS Provision of services

All machines supplied **include services** performed by qualified **ETT** personnel:

- Commissioning and settings
- On-site and telephone technical support
- Troubleshooting within the warranty period

**ETT** also offers a choice of service contracts for its customers :

- Customised maintenance programme or maintenance contract
- Safety regulatory controls and tightness checks (**PED**)
- Emergency supply of spare parts
- Factory supervision
- Staff training.



## Interview with **Michael ROBUCHON**, Aerospace Market Manager at **ETT**



**How did ETT come to create a unit in its organisation dedicated to the Aerospace Market?**

**Mr Robuchon :** For some years now, we have had specialised services in ETT's traditional markets such as Retail, Industry and the Energy sector (Oil & Gas, Wind, Offshore, etc.).

The increase in projects, the number of machines installed over the last decade, but also the technical specificities that are clearly emerging, have naturally led us to consider Aeronautics as a fully business segment.

This is why, for several years, our specialised structure (Technical, R&D, Quotation) has been exclusively dedicated to dealing with the needs of the various players in this market.

**Regarding customer needs, what is your impact on product development ?**

**Mr Robuchon :** It is precisely because we have specialised in this area that we are able to translate their expectations into product functionality in the best possible way.

Listening to our trusted customers, speaking the same language, following them over time and meeting new ones allows us to integrate each of their current concerns into our range developments.

The agility of our industrial tool is an opportunity because it allows us to be very reactive in the development of new solutions.

**And what are the current concerns of the aeronautical sector ?**

**Mr Robuchon :** For some time now, we have been aware of the importance of the subject of decarbonisation, both for the airport world and for industry. That's why all our heat pumps are energy efficient, using only low GWP refrigerants. This year, 2023, is an important step for the Aeronautical Cell as we are launching the marketing of our brand new range of R513A ACUs in two versions: one for our historical aircraft manufacturer partners (Airbus, Dassault, ATR) and another specifically adapted to airports.