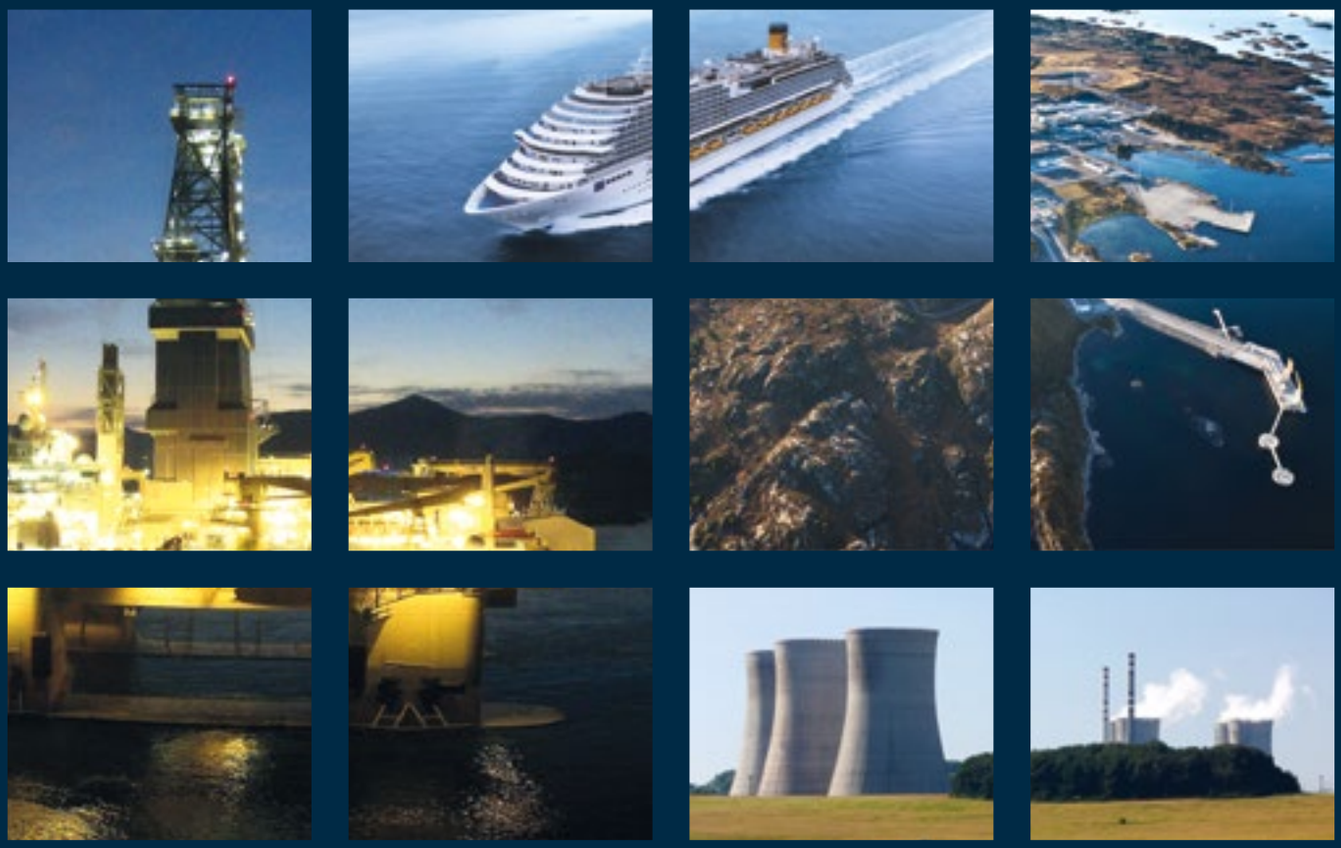

ROCCHEGGIANI®

care for air

SPECIAL CONSTRUCTIONS

Marine - Offshore - Oil & Gas - Power plants

TABLE OF CONTENTS

ROCCHEGGIANI®
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Entrance to the Headquarter | Head offices - Technical offices

THE SIGN OF EVOLUTION, A REALITY WITH AN IMPORTANT HISTORY

Professionalism and reliability: values that represent the heritage of more than fifty years of Roccheggiani business and who daily inspire the work of the present and the future.

COMPANY PROFILE

**Commitment, intuition
and a constant striving for quality.**

A history spanning over half a century.

Roccheggiani's beginnings date back to 1958, rooted in the metal construction and plant component sector. A typical Italian entrepreneurial endeavour, characterized by rewarding success. This dogged determination has enabled the company to become a leader in the manufacture of ducts and components for air distribution plants, stainless steel flues and air handling plants, heat recovery systems and terminal units.

ROCCHEGGIANI®
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Headquarter
Technical & management offices

HVAC department

A FEW FIGURES OF A COMPANY WITH MARKET LEADERSHIP

Three production units with a total of about 32,000 square meters and more than 30 countries around the world. These are just a few figures that give an idea ofthe size and social importance, both in terms of structure and production, both in terms of presence in the world market.

ISO 9001 certified Company since 1996.

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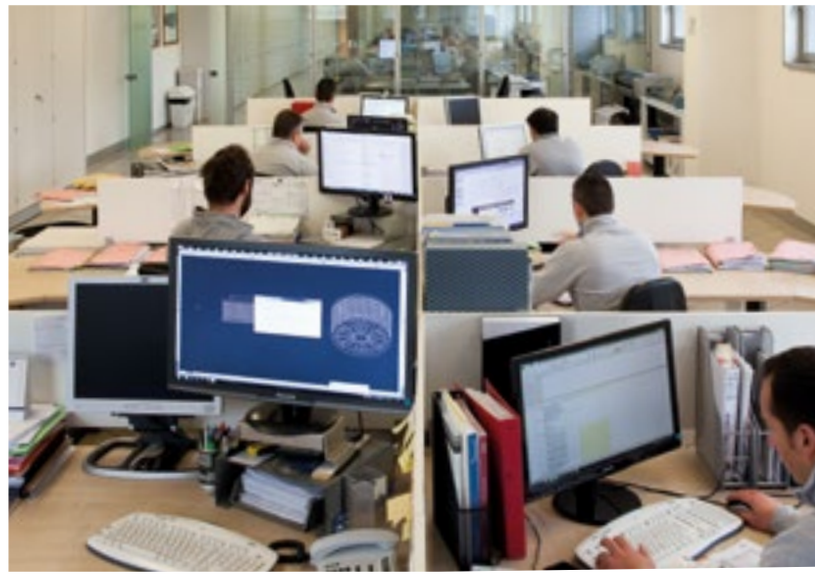
HEADQUARTERS: HEART AND MIND OF THE COMPANY

RESEARCH & DEVELOPMENT



Human capital is the driving force of a company, a real treasure trove at the service of the end customer.

Attentive to the evolution of the market and to the delicate relationship between supply and demand, Roccheggiani has always invested in technological research and the professional development of its staff. The company's precious centrepiece is its technical and information support offered to customers from design to the start-up and service.

Engineers and technicians are constantly updated concerning regulatory developments and analyse every aspect about plant engineering problems, working closely with domestic production. Periodically the company organises training sessions for heat engineering firms, retailers and installers to create a foolproof work team.

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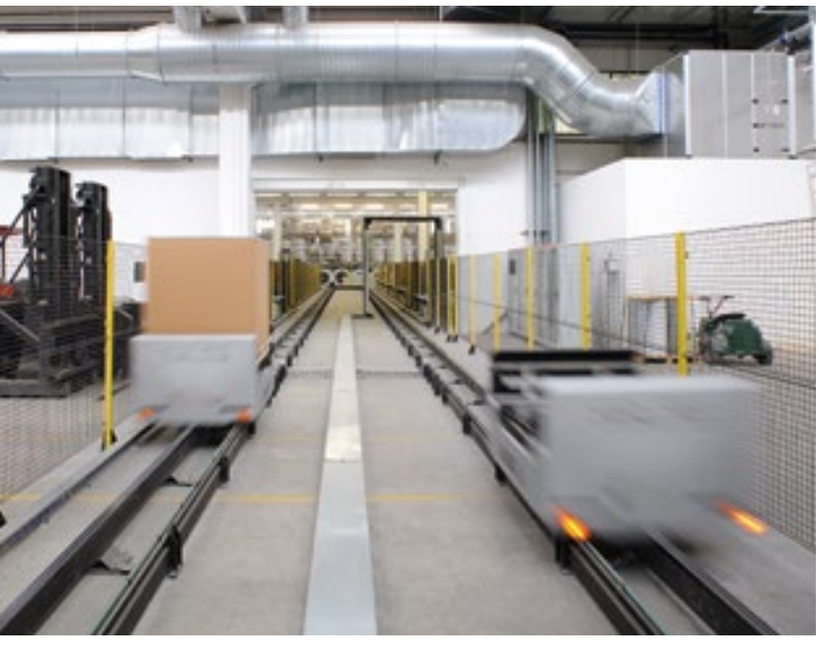
CONSOLIDATED EXPERIENCE, ADVANCED TECHNOLOGY

Roccheggiani has always invested in research and technology. These initiatives are geared towards manufacturing increasingly innovative and qualitatively evolved products.

HVAC DEPARTMENT

The state-of-the-art technology to improve the quality of the products

Everything is designed and produced on its own premises. Premises where Roccheggiani has high automation in its production processes, with advanced lines for profiling, extrusion, moulding, punching, robot-controlled panelling and press-forming, laser cutting and welding. The company has been awarded Eurovent certification for its air handling units in the CTA series.



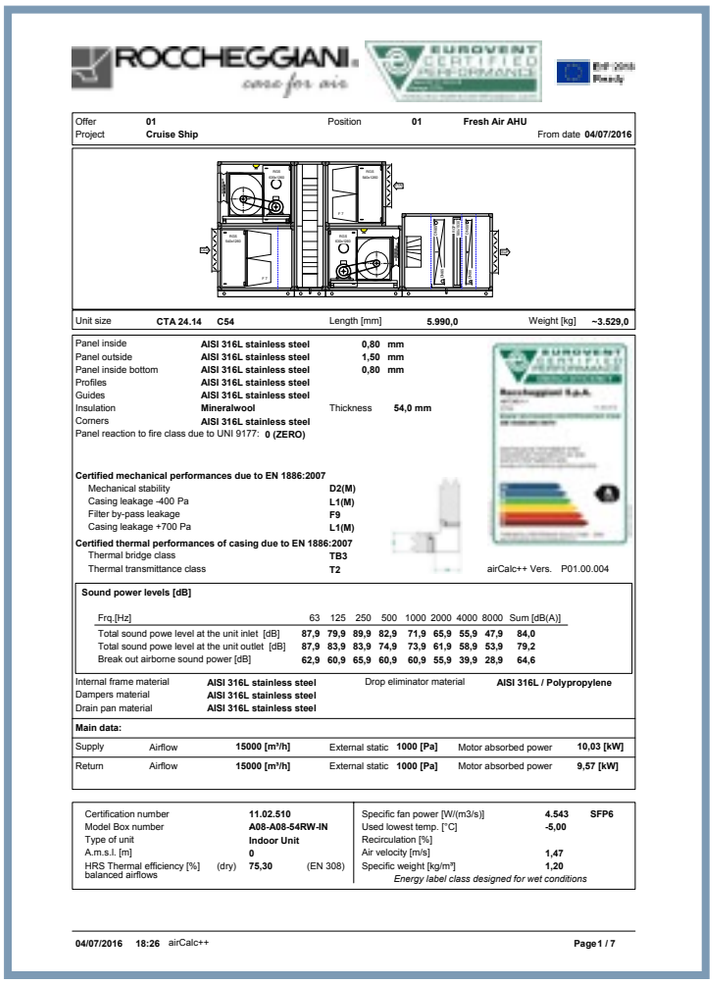
A fully-integrated design and production to meet Customer Expectation

Among the first in the world to have a climate chamber, made according to the criteria of the EN15116 standard, the company has a test room for testing the performance of the air handling units.

Advanced lines for profiling, extrusion, moulding, punching, robot-controlled panelling and press-forming, laser cutting and welding, a high degree of production process automation and a completely automated warehouse. An evolved integrated management system ensures the smooth running of processes.

ROCCHEGGIANI®
care for air

THE STRONGEST CONSTRUCTION FOR THE HARDEST CONDITIONS



ROCCHEGGIANI care for air

Offer	01	Position	01	Fresh Air AHU	
Project	Cruise Ship			From date	04/07/2016

Unit size	CTA 24.14 C54	Length [mm]	5.990,0
Weight [kg]	~3.529,0		

Panel inside	AISI 316L stainless steel	0,80	mm
Panel outside	AISI 316L stainless steel	1,50	mm
Panel inside bottom	AISI 316L stainless steel	0,80	mm
Profiles	AISI 316L stainless steel		
Guides	AISI 316L stainless steel		
Insulation	Mineralwool	Thickness	54,0 mm
Corners	AISI 316L stainless steel		

Panel reaction to fire class due to UNI 9177: 0 (ZERO)

Certified mechanical performances due to EN 1886:2007

Mechanical stability	D2(M)
Casing leakage -400 Pa	L1(M)
Filter by-pass leakage	F9
Casing leakage +700 Pa	L1(M)

Certified thermal performances of casing due to EN 1886:2007

Thermal bridge class	TB3
Thermal transmittance class	T2

airCalc++ Vers. P01.00.004

Sound power levels [dB]

Frq.[Hz]	63	125	250	500	1000	2000	4000	8000	Sum [dB(A)]
Total sound powe level at the unit inlet [dB]	87,9	79,9	89,9	82,9	71,9	65,9	55,9	47,9	84,0
Total sound powe level at the unit outlet [dB]	87,9	83,9	83,9	74,9	73,9	61,9	58,9	53,9	79,2
Break out airborne sound power [dB]	62,9	60,9	65,9	60,9	60,9	55,9	39,9	28,9	64,6

Internal frame material	AISI 316L stainless steel	Drop eliminator material	AISI 316L / Polypropylene
Dampers material	AISI 316L stainless steel		
Drain pan material	AISI 316L stainless steel		

Main data:

Supply	Airflow	15000 [m³/h]	External static	1000 [Pa]	Motor absorbed power	10,03 [kW]
Return	Airflow	15000 [m³/h]	External static	1000 [Pa]	Motor absorbed power	9,57 [kW]

Certification number	11.02.510		Specific fan power [W/(m3/s)]	4.543	SFP6
Model Box number	A08-A08-54RW-IN		Used lowest temp. [°C]	-5,00	
Type of unit	Indoor Unit		Recirculation [%]		
A.m.s.l. [m]	0		Air velocity [m/s]	1,47	
HRS Thermal efficiency [%] balanced airflows	(dry) 75,30	(EN 308)	Specific weight [kg/m³]	1,20	

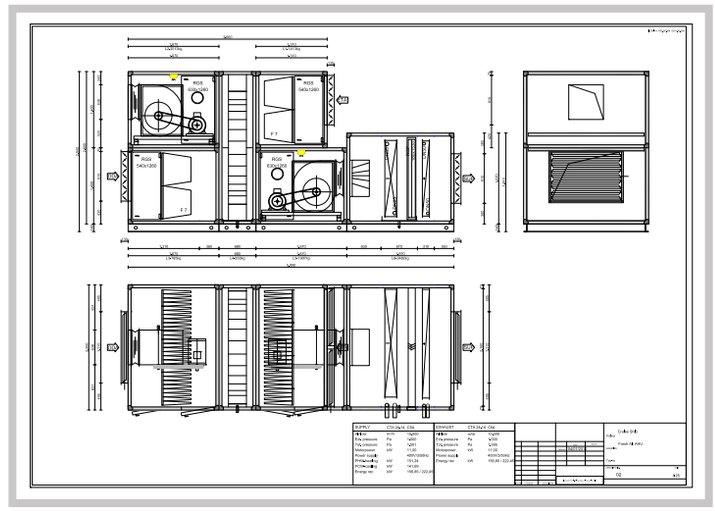
Energy label class designed for wet conditions

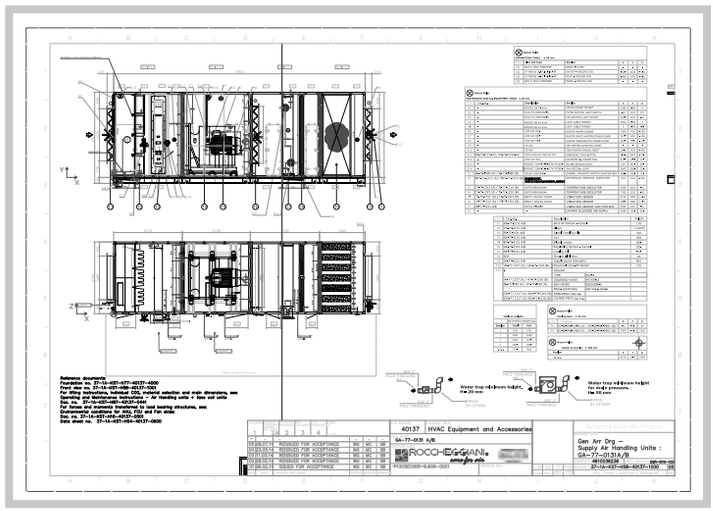
04/07/2016 18:26 airCalc++ Page 1 / 7

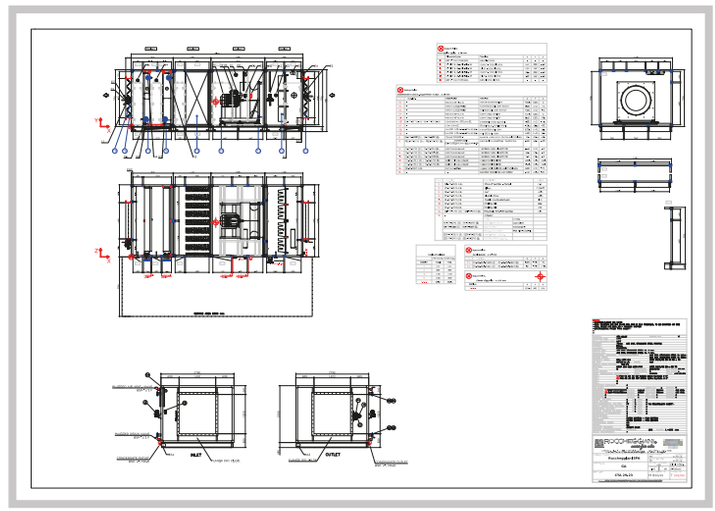
Air handling unit design

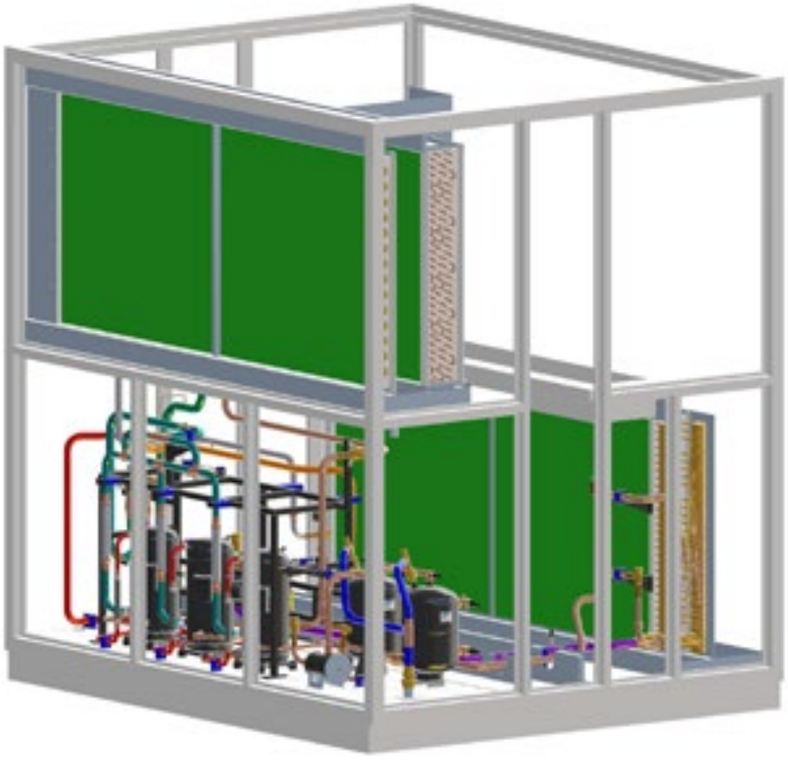
A complete technical datasheet including all the components performance and the unit layout is submitted to the approval of the customer before issuing certified drawings.

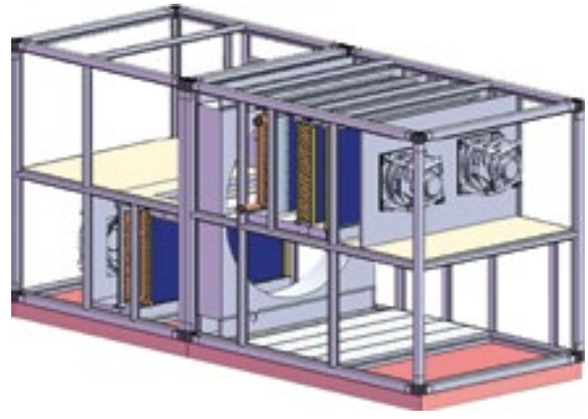
A fully detailed certificated AutoCAD® 2D drawing is submitted to the customer for approval before manufacturing.





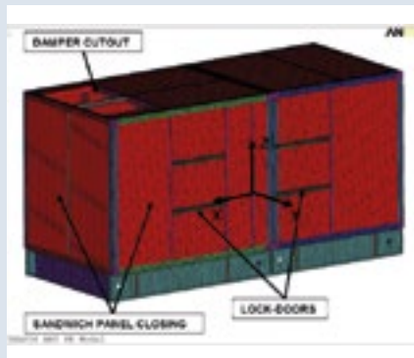


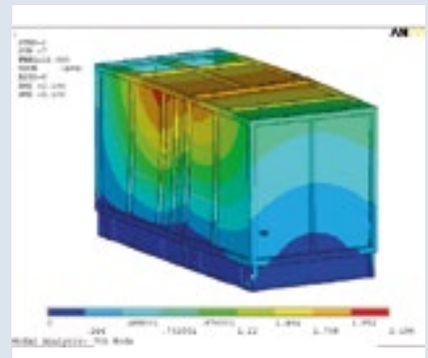




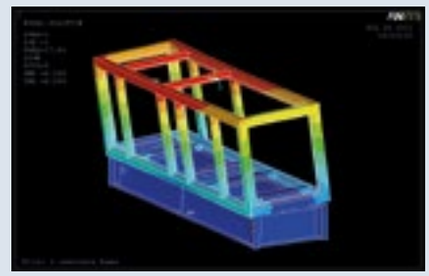
Upon Customer request a 3D model (Solidworks®) of the units can be provided for ducts, pipes and system interface.

Upon Customer request a Finite Element Analysis can be performed on a unit model to evaluate structural strength to withstand: pressures, loads (double-deck units), vibrations ageing, seismic vibrations on building response spectrum, Waves (pitch, roll, heaves), Wind, ...





The Finite Element Models have been validated and corrected through several tests on shacking tables at E.N.E.A. (Italian National Agency for New Technologies), Energy and Sustainable Economic Development (former National Agency for Nuclear Energy).



AN AIR HANDLING UNIT FULLY COMPLIANT TO…

ISO 15138:2007
Petroleum and natural gas industries - Offshore production and installations - Heating, ventilation and air-conditioning:
- Annex A.12 in all the functional requirements, access doors and even, upon Customer request, factory fitted controls
- All the components related Annexes:
  - A.4 - Heating coils …
  - A.5 - Cooling coils …
  - A.6 - Humidifiers
  - A.7 - Fans
  - A.8 - Sound attenuators
  - A.10 - General dampers
- Annex E for duct interface flanges.

Statoil TR 1562
HVAC Design and fabrication requirements:
All the units are designed to optimized the space inside the casing to minimize the pressure drop of the components;
The casing Air leakage rate comply with class L2 (EN 1886: 2007).
All materials and components comply with the fabrication requirements:
- "Draining" type F7 class filters (EN 779);
- Titanium coils when seawater circulating or above 60°C, AISI;
- 316L may be used in fresh water cooling coil;
- AISI 316L Electric heating coil Ex-d(e) T1-4 step or proportional control/thyristor with Ex-d IIB,C T1-T6 safety thermostats;
- Spark-proof Direct-driven Plug-fan preferred choice made of AISI 316L capable of 160% nominal duty in 2 x 50% systems, fixed mounted accelerometers available cabled to an external junction box;
- ATEX 2014/34/EU - Ex marking for classified equipment.

Shell DEP
DEP 37.76.10.10 HVAC for offshore installations (amendments/ supplements to ISO 15138);
DEP 31.76.10.11-Gen. Installation, testing and balancing, and commissioning of HVAC systems.

Total
General Specification HVAC GS EP HVA 202;
Air Handling Unit (AHU).

EN 14986:2007
Design of fans working in potentially explosive atmospheres.

EN 13463-1:2009
Non-electrical equipment for use in potentially explosive atmospheres. Basic method and requirements.

EN 60079-14
Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines).

EN 60079-17
Explosive atmospheres. Electrical installations inspection and maintenance.

EN 15198:2007
Methodology for the risk assessment of non-electrical equipment and components for intended use in potentially explosive atmospheres.

CLC/TR 50404:2003
Electrostatics - Code of practice for the avoidance of hazards due to static electricity.

CLC/TC31
Electrical apparatus for potentially explosive atmospheres
The Air handling units are CE marked in conformity to the following standard:
- Directive 2006/42/EC on machinery;
- Directive 2004/108/EC Electromagnetic Compatibility (EMC);
- Directive 2006/95/EC Low Voltage Directive (LVD).

The Air handling units can be CE - ex marked in conformity to the 2014/34/EU - ATEX Directive up to Category 2 Zone 1 with the deposit of the Technical File (Annex VIII) at Bureau Veritas Italia notified body no. 1370.

BVI/ATEX/ITA/15/069

II 2/2 G II TX (-20°C < Tamb < +40°C)

EN 1886:2007
Air handling units Mechanical performance

The mechanical performance of the Roccheggiani Air Handling Units have been tested in the TÜV SÜD laboratories (rep. no. 6889) under the Eurovent Certification program and the units belong to the following classes:
- Mechanical strength of the casing: **D1(M)** with maximum measured deflection 2,6mm/m.
  Units can withstand to ±2500 Pa with no permanent deflections.
- Casing Air leakage: L2(M)
- Filter by-pass leakage: **F9** - percent leakage < 0,1%

Leakage test according to EN 1886:2008
Positive Pressure

The Air handling unit can be tested upon Customer request on:

- Airflow volume and Static Pressure
- Vibration
- Leakage
- Noise
- Cooling (Water at 7°C up to 140kW)
- Heating (Water at 80°C up to 500kW)

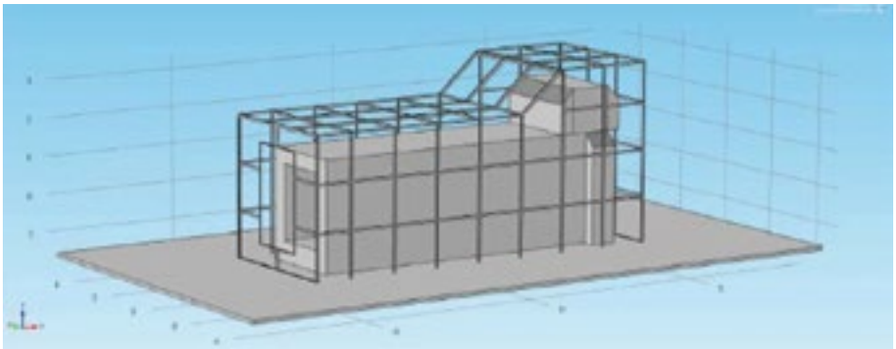
Due to the following standards:

- EN 13053:2007
- EN 12599:2001
- EN 1886:2007
- ISO 14694:2003
- ISO 3744/3746
- ISO 9614

A mock-up room/cabin can be arranged in our laboratory for a complete simulation.

Noise test according to ISO 3744/3746
Sound power level determination

Noise test according to ISO 9614-1
Sound power level determination



ROCCHEGGIANI®
care for air

The Achilles qualification

This qualification concerns the product and service categories listed in the appendix:

1.12.01	**HVAC System Packages**	C)
1.12.02	**Cooling and Refrigerazion Units**	C)
1.12.04	**Air Fans**	C)
1.12.05	**Air Filters, Coalescers and Accessories**	C)
1.12.06	**Damper and Accessories**	C)
1.12.07	**Ducting etc.**	C)
1.12.99	**Other HVAC Equipment and Accessories**	C)

www.achilles.com

THE MAGIC WORD: RESEARCH

GOAL: QUALITY

In order to be competitive on the market and retain a high degree of product quality, over the years Roccheggiani has established several synergies and collaborations with renowned research institutes. These activities are aimed at fostering the exchange of skills and constantly improving work methods in order to fully satisfy customer expectations.

Achilles JQS

Joint Qualification System

for suppliers to the Oil Industry in Norway and Denmark

Certificate of Qualification

Awarded to

ROCCHEGGIANI S.P.A.

Company Reg.no: AN 60463

Achilles Id. 60423

Achilles Information Centre hereby confirms that ROCCHEGGIANI S.P.A. is qualified in the Achilles Joint Qualification System for suppliers to the Oil Industry in Norway and Denmark. The qualification concerns the product and service categories listed in the appendix.

Achilles Joint Qualification System for suppliers to the Oil Industry in Norway and Denmark certification.

Precision, efficiency, maximum reliability.

The distinctive traits of Roccheggiani, alongside the company's significant production and sales performances. The company's expertise is reflected in the UNI EN ISO 9001 Quality Management System certification obtained as far back as 1996 in addition to the UNI EN ISO 14001 Environment Management System added in 2014. Besides the numerous product certifications received from the most prestigious European bodies.

www.dnvba.com

UNI EN ISO 9001:2008 and UNI EN ISO 14001:2004 certifications.

DNV BUSINESS ASSURANCE

MANAGEMENT SYSTEM CERTIFICATE

Certificato No. / Certificate No. CERT-01113-96-AQ-BOL-SINCERT

Si attesta che / This is to certify that

Il sistema di gestione per la qualità di / The quality management system of

ROCCHEGGIANI S.p.A.

Via I Maggio, 10 - 60021 Camerano (AN) - Italy
Via I Maggio, 1a - 60021 Camerano (AN) - Italy

è conforme ai requisiti della norma:
has been found to conform to the standard:

UNI EN ISO 9001:2008 (ISO 9001:2008)

Valutato secondo le prescrizioni del Regolamento Tecnico RT-05
Evaluated according to the requirements of Technical Regulations RT-05

Questa Certificazione è valida per il seguente campo applicativo:
This Certificate is valid for the following product or service ranges:

Progettazione, produzione di canne fumarie a doppia e singola parete in acciaio inox, tubi flessibili, centrali trattamento aria, ventilatori cassonati e travi fredde.
Progettazione, produzione ed installazione di impianti aeraulici. Commercializzazione di accessori
(Settore EA : 17 - 18 - 28 - 29)

Design, manufacture of double and single wall stainless steel chimneys, flexible tubes, air handling units, extraction fans and chilled beams.
Design, manufacture and installation of aeraulics plants. Trade of accessories
(Sector EA : 17 - 18 - 28 - 29)

Data Prima Emissione/Initial Certification Date: 1996-08-01

Il Certificato è valido fino al: This Certificate is valid until: 2017-07-02

L'audit è stato eseguito sotto la supervisione di/ The audit has been performed under the supervision of

Claudio Coppa
Lead Auditor

Luogo e Data/Place and Date: Agrate Brianza (MB), 2014-07-01

Per l'Organismo di Certificazione: For the Certification Body:

Zeno Beltrami
Management Representative

La validità del presente Certificato è subordinata al rispetto delle condizioni contenute nel Contratto di Certificazione.
Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

DNV BUSINESS ASSURANCE

MANAGEMENT SYSTEM CERTIFICATE

Certificato No. / Certificate No. 154050-2014-AE-ITA-ACCREDIA

Si attesta che / This is to certify that

ROCCHEGGIANI S.p.A.

Via I Maggio, 10 - 60021 Camerano (AN) - Italy
Via I Maggio, 1a - 60021 Camerano (AN) - Italy

è conforme ai requisiti della norma per i sistemi di gestione:
has been found to conform to the management system standard:

UNI EN ISO 14001:2004 (ISO 14001:2004)

Valutato secondo le prescrizioni del Regolamento Tecnico RT-09
Evaluated according to the requirements of Technical Regulations RT-09

Luogo e data/Place and Date: Agrate Brianza (MB), 2014-05-19

Per l'Organismo di Certificazione: For the Certification Body:

Zeno Beltrami
Management Representative

ROCCHEGGIANI®
care for air

Marine

Off-shore, Oil & Gas

Power Plants

Roccheggiani's proposal for the Oil & Gas world includes:

- Air Handling Units (AHU)
- Weatherproof containerized Air Handling Units
- Fan Coil Units (FCU)
- Self Contained Units (SCU)
- DX Split Units
- Extract fan skids
- Fan heaters
- Louvres and air terminal devices
- Special dampers
- Ductworks

SPECIAL CONSTRUCTIONS PRODUCTION RANGE

Where the demand is for very high quality, Roccheggiani excels.

The Roccheggiani air handling units and systems are designed to comply with European standards and the CE mark, according to the highest standards that guarantee the best performance even in the most extreme conditions.

ROCCHEGGIANI®
care for air

Marine
Air Handling Units

A constantly evolving company that has made history

Roccheggiani's Marine Air Handling Units have been designed and built to meet all possible requirements for marine air conditioning systems, in full compliance with the most stringent health and safety regulations. Each unit includes normalised standard modular sections, allowing maximum liberty in the selection of the air handling plant, and providing total comfort in the areas of utilization. Built in compliance with EN 1886 mechanical features, and adopting state-of-theart technology, all units are fully assembled in our facilities for stringent vibration and performance tests and certifications on the motor-fan assembly.

Main components
Mixing section including dampers providing opposed blade operation, manually or motor operated via electric actuators. Air filtering section including flat pleated or pocket filters (G4 efficiency), or rigid bag filters (efficiency F5, F6, F7, F8).
Water or direct expansion Cu-Cu coil, up to 14 rows. Droplet separators. Rotary enthalpic heat recovery unit. Supply and return fan section. Supply and return plenum with connection for round or square ducting. The following range of accessories is available: inspection window, energy-saving internal lighting, antifreeze thermostat, differential pressure switch, U-type pressure gauge for filters, smoke dampers, actuators for dampers.

Base
Epoxy painted or Hot dip Galvanised steel base, 140 mm high.

Frame fabrication
Penta-post frame manufactured from Roccheggiani own design Anodised Aluminium, AISI 304 or AISI 316L stainless steel sections and 40 mm or 70 mm pre-loaded fibreglass reinforced or AISI 304/316L corner pieces.

Panels
Sandwich-type panels, 25 or 54 mm thick, internal and external plates made of Galvanized Steel, AISI 304 or AISI 316L stainless steel plates. Interposed insulation in either high-density expanded polyurethane foam (approx. 45 Kg/m3) or approved mineral wool (approx. 100 Kg/m3). The panels are secured to the frame through AISI 304/AISI 316L nutser and bolts fitted inside closed nylon bushings. Maintenance and inspection panels are fittedwith lockable nylon handles and hinges.

Pan
Sloped drain pan, made of AISI 316, steel, fitted with single or twin drains (1½" gas) located in opposite positions, insulated externally with approved anti condensation material.

Internal plates
Internal plates manufactured from AISI 304 stainless steel or AISI 316 steel.

Dampers
Multiblade external air and recirculation air dampers with opposed blade operation, made of various materials, including airfoil aluminum, galvanized steel, AISI 304 or AISI 316L stainless steel. All dampers are suitable for manual or motorized operation.

Filters
The following types of filters are available: Cell type, with renewable multi-pleated synthetic filter section, 90 mm th., efficiency class G4-EN 779 Bag type, with synthetic filter section, 360 mm th., efficiency class G4-EN 779 These types of filters are self-extinguishing class 1.
Other types of bag filters, with efficiency classes F5, F6, F7, F8, or F9 are available upon request.

Hygroscopic sorption enthalpy heat recovery wheel
Air-to-air, rotary hygroscopic sorption enthalpy heat recovery unit, with honeycomb wheel in hygroscopic aluminum, can be provided with removable sections, or single body wheel, and fixed or variable rotation speed.

Heat exchange coil
Bundle-type heat exchange coils, operating with cold or hot water, and with copper pipes and fins. Stainless steel AISI 304 or AISI 316 frame. Copper manifolds with gas-threaded taps, fitted with air vent and water drainage valves. All coils have been tested to a pressure of 20 bar.

Droplet separator
Multi-blade droplet separator, with AISI 304 or AISI 316 stainless steel frame and flame-resistant polypropylene fins B2-DIN4102.

Industrial fans
Double intake fans are used, fitted with backward inclined, airfoil or flat plate blades.
The volute and the impeller are of heavy carbon steel construction, protected by an epoxy coating. Bearings and chocks are fitted with greasing nipples.

Electric motors
Three-phase asynchronous motors, made by UNEL-MEC, suitable for operation in tropical environments, with cast iron or epoxy coated aluminum casing. Insulation class F and protection IP55.
Motors of varying polarities are available as required, with 380V, 440V, 690V – 3 Phase - 60 Hz power supply.

Motor/fan frame
The base support frame of the motor/fan assembly is a galvanized carbon steel fabrication, and is isolated from the structure of the unit by special rubber suspensions.

ROCCHEGGIANI®
care for air

Marine Cabin
Fancoil Units

Air flow range: 300-700 (m^3/h) - Temperature and Airflow control inside Crew and Passengers Cabins and Living quarters;

- manufactured with 0,8 mm thick galvanized
- Fully insulated casing
- Direct-driven EC motor Plug-fan
- Copper/Copper coil
- Full size G4 panel filter
- AISI 316L Stainless steel Drain Pan

Automatic electronic control including:

- Stepless fan-motor control;
- 3-port (2-port) valve with lock-shield valve;
- Temperature probe NTC (where required);
- Electric re-heater with safety thermostat (230V/1/50Hz);
- Power cable 3 x 1 mm with pass-thru connector;
- 8 poles data cable 7 meters length (loose supplied);
- Diffuser (various plates available for different air-stream displacement);
- Room unit with room temperature sensor and set-point adjuster (thermostat);
- Differential pressure sensor and onboard ethernet communication (upon request);

Cabin
Ventilation Units

Air flow range: 100-350 (m^3/h) - Temperature and Airflow control inside Crew and Passengers Cabins and Living quarters;

- manufactured with 0,8 mm thick galvanized steel 500 x 595 x 240 mm overall size
- Mobile aphonic air flow regulation damper made of Steel AISI 304 or AISI 316L S.S.;
- Airflow equalizer with calibrated holes plate;
- Internally insulated with Rockwool (code 759) mineral wool coated with Interglass (type 018) fibre-glass Canvas; insulation fixed into position by interlocking plates without adhesives or glues.

Available in the following models:

- Manual adjustment airflow volume;
- Manual adjustment airflow volume with electric re-heater and room thermostat;
- Automatic electronic control including:
  - Linear actuator for mobile damper;
  - Temperature probe NTC (where required);
  - Electric re-heater with safety thermostat (230V/1/50Hz);
  - Power cable 3 x 1 mm with pass-thru connector;
  - 8 poles data cable 7 meters length (loose supplied);
  - Diffuser (various plates available for different air-stream displacement);
  - Room unit with room temperature sensor and set-point adjuster (thermostat);
  - differential pressure sensor and onboard ethernet communication (upon request);

ROCCHEGGIANI®
care for air

Marine Public Space and **Technical Space**
Fancoil Units

MARINE FANCOIL UNITS

Air flow range: 1,000-13,000 (m^3/h)
Temperature and Airflow control inside Crew and Passengers Cabins and Living quarters.
Horizontal line through or Vertical unit "Bottom to Top" or "Top to Bottom" air flow direction including:

- Driptray;
- Filter;
- Cooling coil;
- Fan-motor assembly;
- Double skin panels, made of galvanised steel 0,8mm, DNV approved Rockwool Marine Firebatts 100kg/m3 insulation, 25mm thickness
- Structure made of Anodised Aluminium profile with PA6 fiber-glass reinforced corner-pieces;
- Air inlet connection: rectangular jointing frame made of galvanised steel with holes for duct mounting;
- Air outlet connection: rectangular jointing frame made of galvanised steel with holes for duct mounting;
- Water coil made of Copper pipes, Copper fins, Copper headers and AISI 316L Stainless Steel frame;
- Drain pan manufactured from AISI 316L Stainless Steel;
- Threaded pipe connection;
- F5 class filter, U-tube manometer Filter monitor, Galvanised steel frame;
- Direct-driven Plug-fan, epoxy painted 70µm;
- 440V/3/60Hz or 690V/3/60Hz DNV approved Motor - Insulation Class F;
- Wiring of the motor to a junction box outside of the unit, Halogen free flame retardant cable;
- Lifting device consists of no. 4 female threaded eyebolts on top of the unit.

ROCCHEGGIANI®
care for air

Marine-Offshore
Air Handling Units

Fully welded AISI 316L baseframe minimum thickness 3,0 mm certified as a Lifting frame for twice unit operating weight
and capable of supporting the units on 4 supporting points;

AISI 316L Stainless Steel fully welded closed profile and AISI 316L Stainless Steel sandwich panels (available plate: 0,8 - 1,0 - 1,5 mm), (other materials such as Aluminium Alloys and pre-galvanized steel are also available.);
AISI 316L fully welded sloping drain pan "wet" sections and filter section (both upstream and downstream);

Flexibility in width and height, determined by max velocity through components;

Capable of Air volumes over 120,000 m^3/hr and 3000 Pa.

Manufacturing & materials

The Units are manufactured to withstand the roughest conditions:

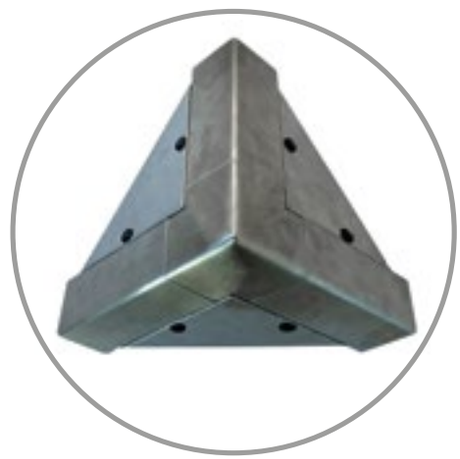
Fully welded AISI 304 or AISI 316L Baseframe minimum thickness 3,0 mm certified as a Lifting frame for twice unit operating weight and capable of supporting the units on 4 supporting point

AISI 304 or AISI 316L Stainless Steel fully welded closed profile

AISI 304 or AISI 316L Stainless Steel fully TIG welded corner pieces

AISI 304 or AISI 316L Stainless Steel sandwich panels (available plate: 0,8 - 1,0 - 1,5 mm), Aluminium Alloys also available

AISI 316L fully welded sloping drain pan "wet" sections and filter section (both upstream and downstream)



The Components within the Air handling Units such as filter cells, coils, dampers, fans and motors are all selected from suppliers approved through Roccheggiani and WTSN quality system, according to specific project requirements.

A complete choice of coils is available (Cu, CuSn, Titanium, P-413C Heresite coating, Al, AISI304, AISI 316, ...) suitable for fresh water, seawater, steam, ... complete with drop eliminators.

DIDW, SISW, Plenum fans available from Epoxy painted Carbon Steel to fully AISI 316L construction for heavy duty purposes.

Any kind of motors depending on project requirements from the most qualified manufacturers.

AISI 304 to AISI 316L IP56 Electric heaters 440V/60Hz or 690V/60Hz available.

Steam humidifications complete with drop eliminators available on Living Quarters units.

Sound attenuators for noise control available upon Customer request.

Manual or Automatic dampers made of AISI 304 or AISI 316L.

Offshore Weatherproof Air Handling Units

The outdoor installation AHUs are assembled in containerazed shelter units to face the most aggressive and the roughest conditions. Construction: **Monolithic Shelter body made of cold rolled AISI 316L profiles jointed with continuous welding and with lifting eyes - Insulation made of Rockwool 50 kg/m³**

Features:

- Roof area: designed to carry maintenance work load, contributes to the entire resistance of the assembled structure, includes four upper lifting eyes for appropriate hooks;
- Internal surface (floor): The floor is made by perimeter profile 6,0 mm with intermediate beams and covered with stainless steel sheet of 3,0 mm finished with anti-acid PVC;
- Openings: The Shelter is supplied with several doors;

- The entire structure has been designed to resist to the following mechanical stresses:
  - Wind Thrust: 30 m/s;
  - Floor load: 1500 Kg/m² for equipment area;
  - Roof Load: 500 Kg/m².

Design Standards:
- UNI 10011/85 Steel construction - Instruction for the calculation, execution and maintenance;
- UNI 10022/85 Steel construction - Instruction for use in the constructions;
- UNI 10012/67 Load hypothesis in the construction;
- UNI 10024/67 Computerized analysis: Approach and editing of the calculation reports;
- LAW no. 64 The structure is built to withstand seismic action as foreseen by Italian law no. 64 of 02.02.74, Ministerial Decree of 24.01.86 and successive updates (structure in seismic areas, 7,5 grade Richter's scale, protection coefficient equal to 1.40).

Water cooled Offshore Fan Coil Units

Features:

- 10 std. sizes from 1100 to 13000 m³/h;

- Upflow or Downflow Air Supply available;

- High efficiency direct-driven Plug-fan available with AC-3 TEFC three-phase motors or fully integrated EC Electric motors;

- High quality Sandwich Panels and Profile construction, 25 and 54mm thick;

- Anodised Aluminium or AISI 316L S.S. profile;

- Galvanised steel, Painted Galvanised steel, AISI 304 or AISI 316L panels;

- Galvanised steel or AISI 316L internal plates;

- Rockwool or Dunapol Rina Approved Polyurethane foam;

- Cu/Al, Cu/Cu, Cu/CuSn, Aisi316L/Cu, Tianium/CuSn or Titanium/AISI 316L Coils;

- Blygold PoluAluXT®, EneryGuard DCC Fluxcoat® or P-413C Heresite® coating available for coils;

- Factory fitted electric control box and control components available.

DX
Offshore Fan Coil Units

Self-contained
Offshore Fan Coil Units

Features:

- 9 std. sizes from 1000 to 16000 m^3/h
- Custom made construction available;
- High quality Sandwich Panels and Profile construction, 25 and 54 mm thick;
- High efficiency direct-driven Plug-fan available with AC-3 TEFC three-phase motors or fully integrated EC Electric motors;
- Anodised Aluminium or AISI 316L S.S. profile;
- Galvanised steel, Painted Galvanised steel, AISI 316L panels;
- Galvanised steel or AISI 316L internal plates;
- Rockwool or Dunapol Rina Approved Polyurethane foam;
- Cu/Al, Cu/Cu, Cu/CuSn Coils;
- Blygold PoluAluXT®, EneryGuard DCC Fluxcoat® or P-413C Heresite® coating available for coils;
- Danfoss refrigeration components;
- Factory fitted electric box and control components available.

ROCCHEGGIANI®
care for air

Extract Fanskids

- Open Structure or enclosed solution available;
- Custom made design for severe duty operation;
- Optional Protective Coating for Offshore facilities according to Shell DEP 70.48.11.30-Gen and NORSOK standard M-501;
- Suitable for Hazardous Area ATEX 2014/34/EU up to Zone 1 2G IIC T3 on request;
- Packaged skids including Shut-off dampers and Sound attenuators to meet the most stringent Noise requirements;
- Axial fans, Centrifugal Fans and Plug-fans available.

ATEX 2014/34/EU Hazardous Area
Fan Heaters

Fan heaters suitable for a number of applications within the Oil & Gas Offshore sector: heating up outdoor workforce on platforms, especially those subjected to harsh environments.

Airflow range: 2000 - 8000 m³/h.

Main components:

- Axial Fan made of AISI 316L stainless steel;
- Heating section: Electric heater or Water heating coil (stainless steel AISI 316L/CuSn);
- Diffuser made of stainless steel AISI 316L with of adjustable fins rows;
- Suitable for Hazardous Area ATEX 2014/34/EU up to Zone 1 2G IIC T3 on request.

ROCCHEGGIANI®
care for air

The split solution:
DX - Air **conditioning** units and Air **cooled condenser** units

Indoor Unit

Outdoor Unit

- **9 std. sizes from 1000 to 16000 m³/h**
- Custom made offshore design for severe duty operation;
- High quality Sandwich Panels and Profile;
- Reliable operation with Twin Semi-hermetic, hermetic reciprocating and scroll compressors;
- Air cooled condenser units fully manufactured from AISI 316L S.S.;
- Factory fitted electric control box and control components available;
- Self-contained units and Packaged units suitable for outdoor mounting;
- Air cooled condenser units and Supply units suitable for Hazardous Area up ATEX 2014/34/EU Zone 1 on request;
- Design according to EN 62061 and IEC/EN 61508-1/7 “fail-safe” and/or “fault-tolerant” with safety standard up to SIL 2, available on request.

The **Self-contained** solution

- **7 std. sizes from 5000 to 25000 m³/h**
- Custom made offshore and onshore design for severe duty operation;
- High quality Sandwich Panels and Profile;
- Reliable operation with Twin Semi-hermetic, hermetic reciprocating and scroll compressors;
- Air cooled condenser units available in fully AISI 316L S.S. construction;
- Shell & Tubes Water cooled condensers for fresh water in Cu/Steel, for Seawater in Marine-grade CuNi/Aisi316L and Titanium/Aisi316L;
- Factory fitted electric control box and control components available;
- Self-contained units and Packaged units suitable for outdoor mounting;
- Air cooled condenser units and Supply units suitable for Hazardous Area up ATEX 2014/34/EU Zone 1 on request;
- Design according to EN 62061 and IEC/EN 61508-1/7 “fail-safe” and/or “fault-tolerant” with safety standard up to SIL 2, available on request.

BVI/ATEX/ITA/15/058

II 2/2 GC IIC T4

The **Self-contained** solution **Custom Application**

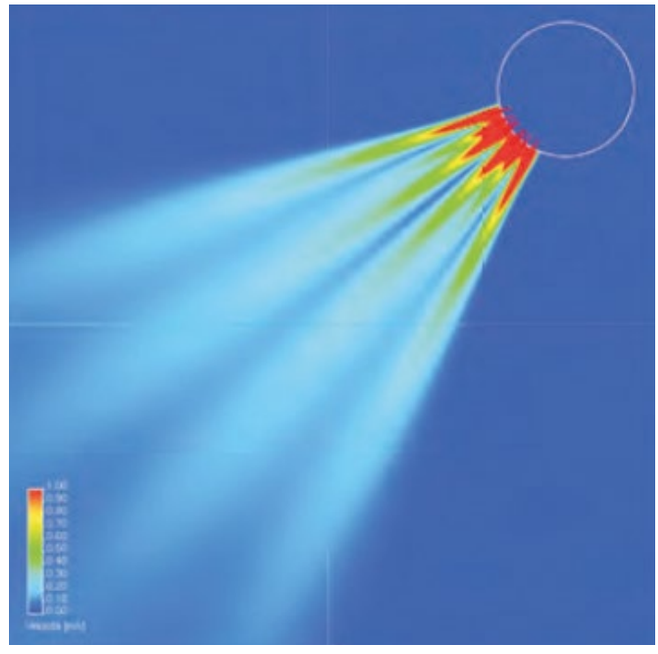
- Tailor made construction based upon Customer request
- Offshore and Onshore design for harsh environment severe duty operation;
- High quality Sandwich Panels and Profile;
- Reliable operation with Twin Semi-hermetic, hermetic reciprocating and scroll compressors;
- Cu/Al, Cu/Cu, Cu/CuSn Coils;
- Blygold PoluAluXT®, EneryGuard DCC Fluxcoat® or P-413C Heresite® coating available for coils;
- Danfoss/Alco refrigeration components;
- Factory fitted electric control box and control components available;
- Air cooled condenser units and Supply units suitable for Hazardous Area up ATEX 2014/34/EU Zone 1 on request;
- Design according to EN 62061 and IEC/EN 61508-1/7 “fail-safe” and/or “fault-tolerant” with safety standard up to SIL 2, available on request.

The Ductworks **Indutair** System

Roccheggiani introduces new high-tech aeraulic system: **INDUTAIR**, the perforated metallic duct for high induction air diffusion.

- Circular perforated modules that integrate the function of the ducts and traditional air diffusion elements.
- Inductive effect, triggered by calibrated holes in the metal pipelines, characterizes the type of the system diffusion.
- Strong effect, generated by the air micro turbulences across the holes, provides a massive induction movement of air in the proximity of the duct:

+ Significant amplification of the amount of ambient air motion;
+ Massive air mixing, up to 20 volumes;
+ Significant reduction of air stratification;
+ Simplified layout: **No need of return ducts,** just a grille on the shelter wall or air conditioning unit casing;



Roccheggiani CFD (Computational Fluid Dynamics) Design Validation and Modeling software:

- Dew points and Ambient Temperature verification;
- Residual Airstream Velocity;
- Air distribution;
- Diffuser Shape design;
- Diameter and position of the holes along the diffuser.

ROCCHEGGIANI®
care for air

Marine & Offshore
Ductworks

Ducts are manufactured according to Offshore ISO 15138:2007 welded by TIG continuous process:

- AISI 304 or AISI 316L Stainless Steel fully welded, factory pickled and passivated.
- Black sandblasted and coated steel ducts: Inner and outer walls are finished by sandblast process SA 2 1/2 and a 15-20 µm thick shop primer layer and coated according to Shell DEP 70.48.11.30-Gen, NORSOK standard M-501 or Oil Company Standards.

Standard Rectangular section ducts:

- Highly automated line for a final product of high quality;
- Cross flanges obtained directly from the plate of the duct itself without fastening or riveting, for better air tightness and mechanical resistance;
- Longitudinal junction of ducts by Pittsburgh-type seam;
- Duct manufacturing is in compliance with UNI 10381 standards.

Special Dampers

Shut-off dampers (Code SO) manufactured from AISI 304 or AISI 316L S.S. certificated according to EN 1751:2003:

- Class 4 (Blades leakage); Class C (Frame leakage);
- NORSOK H-001 Rev. 4 - Gas tight dampers compliant;
- hand-lever for manual operations available upon request;
- Suitable for Hazardous Area ATEX 2014/34/EU up to Zone 1 2G IIC T3 on request;
- Design according to EN 62061 and IEC/EN 61508-1/7 with safety standard up to SIL 2, available as option;
- Suitable for Pneumatic or Electric Actuator;

Opposed blades dampers (Code SC) for control, balancing and adjustment manufactured from Aluminum, Galvanised Steel AISI 304 or AISI 316L S.S. certificated according to EN 1751:2003:

- Class 4 (Blades leakage); Class C (Frame leakage);
- NORSOK H-001 Rev. 4 - Gas tight dampers compliant :
- Suitable for Hazardous Area ATEX 2014/34/EU up to Zone 1 2G IIC T3 on request;
- Suitable for Manual hand-lever, Pneumatic or Electric Actuator;

Back-draught Overpressure Damper (Code SS) manufactured from Galvanised Steel AISI 304 or AISI 316L S.S. certificated according to EN 1751:2003:

- Class 2 (Blades leakage); Class B (Frame leakage);
- Suitable for Hazardous Area ATEX 2014/34/EU up to Zone 1 2G IIC T3 on request.

	RICEVUTA FILE TECNICO ATEX I & F BUREAU VERITAS ITALIA	I&F-IT-IND-OPE-F-011_ATEX Revisione 00 02/04/2014

ROCCHEGGIANI S.P.A.

Milano, 29/10/2015

Oggetto / *Subject:*

Avviso di Ricezione vs file tecnico secondo l'articolo 8.1.b ii della Direttiva ATEX 94/9/CE

Notification of Receipt of your technical file as article 8.1.b ii of the Directive ATEX 94/9/EC

RICEVUTA NUMERO / *RECEIPT NUMBER* : BVI/ATEX/IT

Con la presente si dichiara che in data 29 Ottobre 2015 Bureau Veritas Italia ha ricevuto una copia del seguente file tecnico in forma sigillata:

Herewith, Bureau Veritas Italia declare that on 29th October 2015 has received a copy of the following sealed technical files:

Numero fascicolo / *File number*

REG. 076 Rev. 0

Descrizione Prodotto / *Product description*

DAMPERS - Serrande

Nome e indirizzo del fabbricante / *Name and address of the manufacturer*

ROCCHEGGIANI S.P.A.
Via 1° Maggio, 10
60021 Camerano (AN)

BUREAU VERITAS ITALIA S.p.A.
Via Miramare 15
20126 Milano (Italia)

Organismo Notificato No. 1370
Notified Body No. 1370

custodirà il file per il periodo imposto dalla direttiva.

will store the technical file for the period imposed by the directive.

Unità Coordinamento

Scadenza ricevuto/ Expired date: ***28 Ottobre 2025***

Chrono N0567/15/IC/pv – 15.IT.2163539.783

COMPANY EXPERIENCE & REFERENCES

ROCCHEGGIANI®
care for air

Roccheggiani experience
Cruise ships, ferry boat & mega-yacht equipment

COSTA CROCIERE CRUISING SHIPS

Costa Fortuna - 106.000 tons - Fincantieri Shipyard
N° 86 Air Handling Units – Total Air flow: 1.350.000 m³/h

Costa Magica - 106.000 tons - Fincantieri Shipyard
N° 86 Air Handling Units – Total Air flow: 1.380.000 m³/h

Costa Concordia - 115.000 tons - Fincantieri Shipyard
N° 102 Air Handling Units – Total Air flow: 1.780.000 m³/h

Costa Serena - 114.500 tons - Fincantieri Shipyard
N° 102 Air Handling Units – Total Air flow: 1.810.000 m³/h

Costa Pacifica - 114.500 tons - Fincantieri Shipyard
N° 102 Air Handling Units – Total Air flow: 1.810.000 m³/h

Costa Favolosa - 114.500 tons - Fincantieri Shipyard
N° 102 Air Handling Units – Total Air flow: 1.810.000 m³/h

Costa Fascinosa - 114.500 tons - Fincantieri Shipyard
N° 100 Air Handling Units – Total Air flow: 1,870.000 m³/h

Costa Diadema - 132.500 tons - Fincantieri Shipyard
N° 101 Air Handling Units – Total Air flow: 1,880.000 m³/h

Costa Neoromantica - 54.000 tons – T. Mariotti Shipyard
N° 36 Air Handling Units – Total Air flow: 726.000 m³/h

OCEANIA CRUISES CRUISING SHIP

Marina - 66.000 tons - Fincantieri Shipyard
N° 58 Air Handling Units – Total Air flow: 1.120.000 m³/h

Riviera - 66.000 tons - Fincantieri Shipyard
N° 58 Air Handling Units – Total Air flow: 1.120.000 m³/h

REGENT SEVEN SEAS CRUISES

Seven Seas Explorer - 56.000 tons - Fincantieri Shipyard
N° 47 Air Handling Units – Total Air flow: 1.056.000 m³/h
N° 60 technical Space Fan coil Units – Total Air flow: 126.400 m³/h

TUI CRUISING SHIP

Mein Schiff 3 - 113.300 tons - STX Finland Shipyard
N° 111 Public and Technical Rooms Fan Coil Units –
Total Air flow: 380.000 m³/h

Mein Schiff 4 - 113.000 tons - STX Finland Shipyard
N° 111 Public and Technical Rooms Fan Coil Units –
Total Air flow: 380.000 m³/h

CARNIVAL CRUISING SHIP

Carnival Splendor - 113.300 tons - Fincantieri Shipyard
N° 101 Air Handling Units – Total Air flow: 1.780.000 m³/h

Carnival Dream - 130.000 tons - Fincantieri Shipyard
N° 96 Air Handling Units – Total Air flow: 1.870.000 m³/h

Carnival Magic - 130.000 tons - Fincantieri Shipyard
N° 96 Air Handling Units – Total Air flow: 1.870.000 m³/h

Carnival Breeze - 130.000 tons - Fincantieri Shipyard
N° 96 Air Handling Units – Total Air flow: 1.880.000 m³/h

Carnival Fantasy - 70.370 tons – STX Finland Shipyard
Dry-dock Refitting in Grand Bahama
N° 4 Air Handling Units – Total Air flow: 52.750 m³/h

Carnival Ecstasy - 70.370 tons – STX Finland Shipyard
Dry-dock Refitting in Grand Bahama
N° 8 Air Handling Units – Total Air flow: 114.500 m³/h

Carnival Vista - 135.000 tons - Fincantieri Shipyard
N° 93 Air Handling Units – Total Air flow: 1.940.000 m³/h
N° 190 Technical Space Fan coil Units – Total Air flow: 295.000 m³/h
N° 78 Public Space Fan coil Units – Total Air flow: 203.000 m³/h

P&O CRUISING SHIP

Crown Princess - 109.000 tons - Fincantieri Shipyard
N° 87 Air Handling Units – Total Air flow: 1.820.000 m³/h

Emerald Princess - 116.000 tons - Fincantieri Shipyard
N° 88 Air Handling Units – Total Air flow: 1.880.000 m^3/h

Ventura - 116.000 tons - Fincantieri Shipyard
N° 87 Air Handling Units – Total Air flow: 1.860.000 m^3/h

Ruby Princess - 116.000 tons - Fincantieri Shipyard
N° 86 Air Handling Units – Total Air flow: 1.780.000 m^3/h

Azura - 116.000 tons - Fincantieri Shipyard
N° 88 Air Handling Units – Total Air flow: 1.880.000 m^3/h

MSC CRUISES

MSC Seaside - 154.000 tons - Fincantieri Shipyard
N° 73 Air Handling Units – Total Air flow: 1.247.000 m^3/h
N° 78 Public Space Fan coil Units – Total Air flow: 293.000 m^3/h

DISNEY CRUISE LINE

Disney Magic - 83.340 tons - Fincantieri Shipyard
Dry-dock Refitting in Cadiz
N° 20 Air Handling Units – Total Air flow: 281.500 m^3/h
N° 100 Cabin Fan coil Units – Total Air flow: 250.000 m^3/h

Disney Wonder - 85.000 tons - Fincantieri Shipyard
Dry-dock Refitting in Cadiz
N° 14 Air Handling Units – Total Air flow: 155.000 m^3/h

SEABOURN CRUISE LINE

Quest – 32.346 tons – T. Mariotti Shipyard
Windstar Cruises (Star) Pride – 9.975 tons – Schichau Seebeckwerft
Windstar Cruises (Star) Legend – 9.975 tons – Schichau Seebeckwerft
Dry-dock Refitting , N° 5 Air Handling Units – Total Air flow: 82.400 m^3/h

VIKING OCEAN CRUISES

Viking Star - 48.000 tons - Fincantieri Shipyard
N° 60 technical Space Fan coil Units – Total Air flow: 99.000 m^3/h

Viking Sea - 48.000 tons - Fincantieri Shipyard
N° 60 technical Space Fan coil Units – Total Air flow: 99.000 m^3/h

Viking Sky - 48.000 tons - Fincantieri Shipyard
N° 60 technical Space Fan coil Units – Total Air flow: 99.000 m^3/h

FERRY BOAT & PRIVATE OWNERS

MS Superstar AS Tallink group Ferry boat
37.000 tons - Fincantieri Shipyard
N° 34 Air Handling Units – Total Air flow: 656.000 m^3/h

Mega Express III Moby lines Ferry boat
30.000 tons - Cantieri Apuania Shipyard
N° 13 Air Handling Units – Total Air flow: 260.000 m^3/h

Mega-yacht Givi Private owner - CRN Ferretti Shipyard
N° 4 Air Handling Units – Total Air flow: 18.000 m^3/h
N° 8 Fan Coil Units – Total Air flow: 9.000 m^3/h

ROCCHEGGIANI®
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Roccheggiani experience
Oil & Gas Offshore

GVA 7500 (enhanced)
Light NORSOK - ISO15138
Harsh Environment / Deepwater
Semi-Submersible Drilling Unit

Equipment delivered:
- N° 6 Deck Cooling Air Handling Units
- N° 4 Columns & Pontoons Cooling AHUs
- N° 2 Accomodation Air Handling Units
- N° 2 Galley Air Handling Units
- N° 16 DX-type Technical Rooms FCUs

Moss CS60E
Full NORSOK - ISO15138
Harsh Environment / Deepwater
Semi-Submersible Drilling Unit

Equipment delivered:
- N° 4 Deck Cooling Air Handling Units
- N° 8 Columns & Pontoons Cooling AHUs
- N° 2 Accomodation Air Handling Units
- N° 2 Galley Air Handling Units
- N° 1 Air Compressor Room AHUs

Moss CS60E - Light NORSOK - ISO15138
Harsh Environment / Deepwater
Semi-Submersible Drilling Unit

Equipment delivered:
- N° 4 Deck Cooling Air Handling Units
- N° 10 Columns & Pontoons Cooling AHUs
- N° 2 Accomodation Air Handling Units
- N° 2 Galley Air Handling Units
- N °7 DX-type Technical Rooms FCUs

Living Quarter + Jkt
Full Shell DEP - ISO15138

Equipment delivered:
- N° 2 Living Quarter Air Handling Units
- N° 2 Living quarter Extract Units
- N° 4 Fanskids
- N° 12 EN1751 - Class C/4 Shut-off dampers

FPSO Conversion - ISO15138

Equipment delivered:
- N° 2 Air Handling Units
- N° 1 Fully welded AISI 316L Complete Ductworks System

LNG Onshore Process Terminal
Full NORSOK - Full Shell DEP - ISO15138

Equipment delivered:
- N° 14 Air Handling Units
- N° 7 Encased Fanskid
- N° 4 DX Self-contained Units

Zuluf Gosp-1 Offshore Field
ISO 15138
Fixed Offshore Production facilities

Equipment delivered:
- N° 2 Pressurization Systems (AHUs and Ductworks)

Zakum West Super Complex
ISO 15138
Fixed Offshore Production facilities

Equipment delivered:
- N° 2 Temporary Refugee DX Packaged Self-contained Systems (SCUs and Ductworks)

B8 Oil Field - ISO 15138
Jack-up Rig Conversion

Equipment delivered:
- N° 8 DX Packaged Self-contained Units
- N° 4 Ventilation Skid

Draugen Platform - ISO15138
Full NORSOK - Full Shell DEP
Fixed Offshore Rig modification

Equipment delivered:
- Lifeboats Air handling Unit

Fpso P-75 / P-76 / P-77
Area Development - ISO 15138
Floating Production, Storage and Offloading vessel

Equipment delivered:
- N° 12 Safe Area Ventilation unit
- N° 15 ATEX rated extraction fans

Tempa Rossa Oil Field
Full Total HVAC GS EP HVA 202
Onshore Production facilities

Equipment delivered:
- N° 11 Air handling Units
- N° 36 Ventilation Unit

Roccheggiani experience
Oil & Gas Onshore - Power Plants

MOCHOVCE NUCLEAR POWER PLANT 3 VVER/4 VVER 440/213 440 MWe
Mochovce (Slovakia)

- N° 102 Air handling Units

ZUBAIR OIL FIELD DEVELOPMENT
Hammar/Rafidiyah/Zubair Iraq

- N° 33 DX Packaged Self-contained Systems (SCUs and Ductworks)

ZUBAIR OIL FIELD DEVELOPMENT
Mishrif/Rafidiyah Iraq

- N° 14 DX Packaged Self-contained Systems (SCUs and Ductworks)

TAWKE PSC
Kurdistan Region of Iraq

- N° 2 DX Packaged Self-contained Systems (SCUs and Ductworks)

ROCCHEGGIANI®
care for air

Roccheggiani S.p.a.

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