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## HYGIENIC DESIGNED AHU

Highest Demands on Air Handling Technology.

AHU concepts specifically optimized to suit your application.



ITALY TECHNOLOGY  
Since 1959





# ABOUT SAIVER AIR HANDLING SYSTEM

SAIVER is the leading European manufacturer of high quality tailored made Air Handling Units for more than half-century. The A1 Series Air Handling System is the culmination of experiences over the years together with continuous improvement through Research and Development. The superior quality of the A1 Series has also been recognized throughout the world and has garnered the recognition and certification of EUROVENT.

SAIVER has kept pace with the latest technology and has incorporated such knowledge with our own brand of ingenuity and innovation to provide the best solutions for our customers. Therefore SAIVER manufactures CUSTOM-MADE units economically, efficiency and quality assuringly.

Over the years, SAIVER has built a very strong reputation in providing solutions in hygienic applications to various sectors that demand for high indoor air quality. Such applications may refer to operating theaters, laboratories, semiconductor clean rooms, hospitals and among other equivalents. At SAIVER, we aim to deliver the best solutions to suit your hygienic HVAC needs.

## Quality Assurance & Certification

- ISO 9001:2015 Certified
- Eurovent Certified According Compliance EN1886 : 2008
- Hygienic Standard - VDI 6022 Compliance
- AHRI 410 Coil Standard
- BS 848 & AMCA Fan Standard

VDI 6022 is a set of guideline originated from the Association of German Engineers (VDI) with regard to the hygiene requirements for ventilation of indoor air quality. It ensures the conditioned air contains no pathogenic spores or hazardous substances. Materials certified under VDI 6022 undergo extensive testing to ensure that they cannot provide a growth base for bacteria or fungi and for the release of hazardous substances. VDI 6022 certified materials are easy to clean and sealed surfaces are able to withstand cleaning and disinfection agents.



# CLEAN ROOM CLASSIFICATION

Clean room is a controlled environment that is specified by the number of particles per cubic meter at a specified particle size. Typically used in every industry where small particles can adversely affect the company operation, such as:

- Pharmaceuticals
- Medical Service Centre
- Semiconductor Manufacturing Plant
- Department of Energy
- Aerospace



ISO Classification Number (N)	Maximum concentration limits (particulates/m <sup>3</sup> of air) for particles equal to & larger than the considered sizes shown below.					
	0.1 µm	0.2 µm	0.3 µm	0.5 µm	1 µm	5 µm
ISO Class 1	10	2				
ISO Class 2	100	24	10	4		
ISO Class 3	1,000	237	102	35	8	
ISO Class 4	10,000	2,370	1,020	352	83	
ISO Class 5	100,000	23,700	10,200	3,520	832	29
ISO Class 6	1,000,000	237,000	102,000	35,200	8,320	293
ISO Class 7				352,000	83,200	2,930
ISO Class 8				3,520,000	832,000	29,300
ISO Class 9				35,200,000	8,320,000	293,000

ISO14644-1, Cleanrooms and associated controlled environments-Part 1: certification of Air Cleanliness

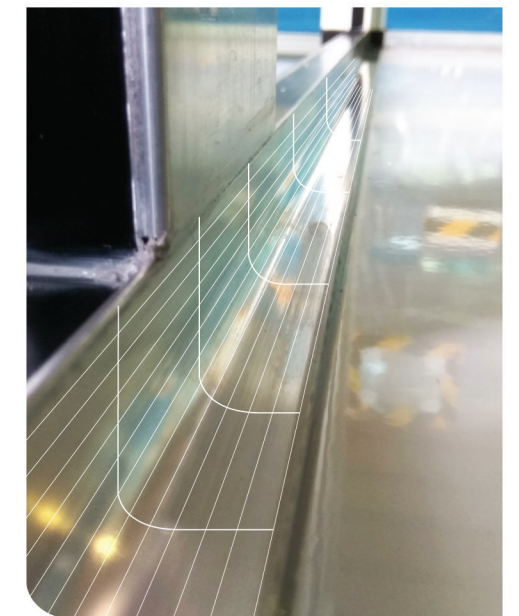
# INTERIOR DESIGN

## Smooth Surface

- Prevents the accumulation of dust particles by eliminating rough surfaces and edges.
- Smooth surface encourages effortless cleaning

## Curved Edges

- Rounded edges and corners prevents accumulation of dust particles.



Curved Edges



# THERMAL PERFORMANCES



Eurovent is Europe's Industry Association for Indoor Climate (HBBAC), Process cooling, and Food Cold Chain Technologies. Its members from throughout Europe, the Middle East and Africa represent more than 1,000 companies. The organization's activities are based on highly valued democratic decision-making principles, ensuring a level-playing field for the entire industry independent from organisation sizes or membership fees.

## Thermal Transmittance [W.m<sup>-2</sup>.K<sup>-1</sup>]

- The heat flow per area and temperature difference through the casing of the air handling unit.
- The lower Thermal Transmittance value is, the better well-insulated the structure is.

Class	Thermal Transmittance, U (W.m <sup>-2</sup> .K <sup>-1</sup> )
T1	$U \leq 0.5$
T2	$0.5 \leq U \leq 1.0$
T3	$1.0 \leq U \leq 1.4$
T4	$1.4 \leq U \leq 2.0$
T5	No Requirement

## Thermal Bridging Factor [k<sub>b</sub>]

- The ratio between the lowest temperature difference between any point on the external surface and the mean internal air temperature and the mean air-to-air temperature difference.
- The closer Thermal Bridging Factor is to 1, the better thermal bridged the structure is.

Class	Thermal Bridging Factor, k <sub>b</sub>
TB1	$0.75 \leq k_b \leq 1.0$
TB2	$0.6 \leq k_b \leq 0.75$
TB3	$0.45 \leq k_b \leq 0.6$
TB4	$0.3 \leq k_b \leq 0.45$
TB5	No Requirement



## SAIVER Offer

	Thermal Transmittance	Thermal Bridging Factor
88mm (TB)	T1	TB1
60mm (DTB)	T2	TB2
60mm (TB)	T2	TB2

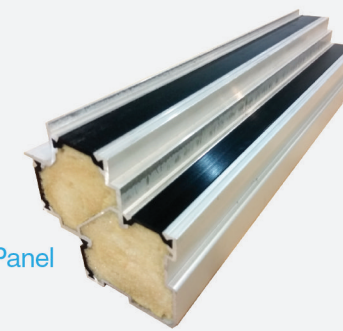
- Premium 88mm panels are favoured for demanding thermal transmittance and thermal bridging factor notably but not limited to outdoor environment.



# HYGIENIC CONSTRUCTION

## Panels

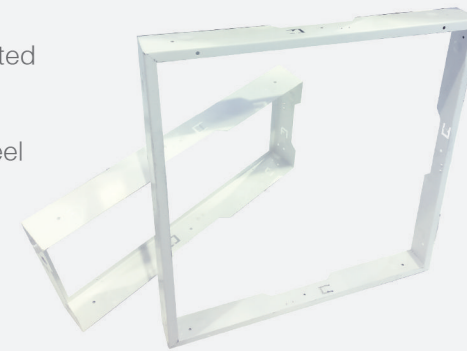
- Double skin Powder Coated Panel
- Double skin Stainless Steel Panel
- T1 TB1 66 mm Thick PU Panel



Double Thermal Break Panel Design

## Filter Frame

- Powder Coated Filter Frame
- Stainless Steel Filter Frame



## Motor

- Cast iron motor coupled with painted steel fan
- Fully Stainless Steel Blower and Motor

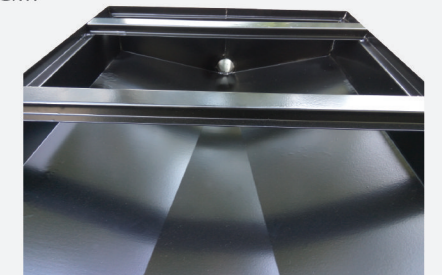


Stainless Steel Fan and Motor

Plug Fan

## Drain Pan

- Powder Coated G.I. Drain Pan
- Stainless Steel Drain Pan



## Heat Exchanger

Copper Tube mechanically bonded to Aluminium Fin

- Normal atmospheric conditions (where the corrosive effect is not high) **Recommended**

Optional Corrosion Resistant Coated Fin

## Hydrophilic and Anti-Corrosion Coated Fin

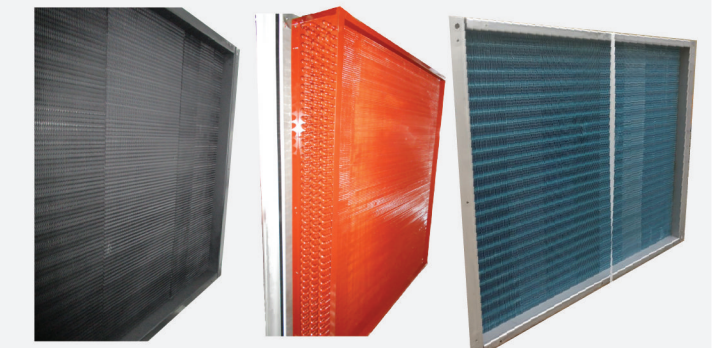
- Corrosion resistance of epoxy coated aluminium metal in high salinity environment is such that it will enable them to last 4 - 7 times as long as non-coated Aluminium.
- Use of DX and water cooling coils particularly in hygienic plants and places of high humidity. **Recommended**

## Epoxy Coating

- Most economical and effective method particularly in protecting metal surfaces in exposed to corrosive environment mainly humid and high salinity environment.
- Highly corrosive environments, cheese production and storage facilities **Recommended**

## Heresite Protective Coating

- Unique based phenolic coating TTP uses to protect air cooled heat exchangers from external corrosion
- High salinity marine conditions including wastewater treatment, swimming pools, and other system that are exposed to chemical fumes. **Recommended**



Epoxy Fin

Heresite Coated Fins

Hydrophilic Fin



# HYGIENIC SOLUTIONS

## UV Lights

- Kills germs and bacteria in the air stream
- Prevents the growth of fungus and mold on coils

## Heat Plate

- Heat recovery hygienic solution with zero cross contamination between supply air and exhaust air.

## HEPA-Filters

- Filters with antimicrobial designed specifically to improve IAQ
- EN1882 Class

Can trap particle size bigger than 0.3 µm. e.g.:

- Carbon Dust
- Sea Salt
- All Combustion Smoke
- Random Progeny
- U15/U16/U17

Can trap particle size bigger than 0.12 µm.

## Silicon Sealant

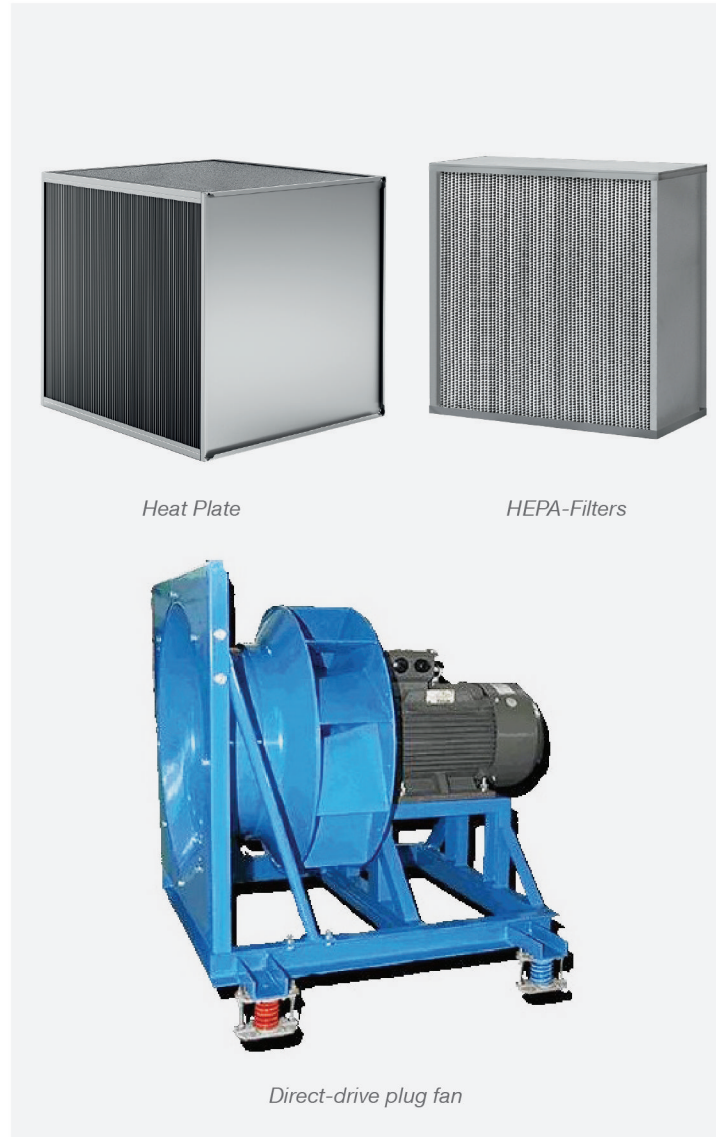
- Food grade silicon sealant are recommended for F&B, clean rooms, operating theatre and other application with high IAQ requirement.
- Food grade silicone are non-toxic, does not contain chemicals or by-products, and does not become brittle/harden over time.

## Direct-drive plug fan

- Open impeller design facilitates efficient cleaning of the impeller.
- Solution to belt residue contamination of a AHU by replacing traditional belt-driven fan and motor design.

## TiO<sub>2</sub> & Nano Silver Coating

- Antibacterial innovation which uses ionic TiO<sub>2</sub> and silver nanoparticles as hygienic solution.
- The additional of this coatings improve the overall anti-bacterial and anti-fungal effect for highly critical and contamination sensitive application.



# JOB REFERENCE HYGIENIC BASED AHU

A map of Southeast Asia and surrounding regions, including Sri Lanka, Bangladesh, Pakistan, Malaysia, Singapore, Brunei, Indonesia, Philippines, Myanmar, and Vietnam. Blue lines connect specific locations on the map to their respective lists of job references.

### SRI LANKA

- Hambanthissa Hospital
- Kalmunai Base Hospital
- Peradeniya Children Hospital
- Suvasevana Hospital
- Cephalosporin Manufacturing Facility
- Glaxosmithkline Pharmaceuticals
- Oncology Pharmaceuticals
- Asiri Kandy Hospital

### BANGLADESH

- ACI Pharmaceuticals
- Eskayef Pharmaceuticals
- Gentry Pharmaceuticals
- Globex Pharmaceuticals
- Glaxo Pharmaceuticals
- Healthcare Pharmaceuticals
- Incepta Pharmaceuticals
- Mundi Pharmaceuticals
- Nuvista Pharmaceuticals
- Orion Pharmaceuticals
- Square Pharmaceuticals
- Radiant Pharmaceuticals
- Reckit Benkiser Pharmaceuticals
- Rangs Pharmaceuticals
- Renata Pharmaceuticals
- Sanofi Pharmaceuticals
- Summon Pharmaceuticals
- White Horse Pharmaceuticals

### PAKISTAN

- Barrett Hodgson Pakistan – New Sterile Area
- Barrett Hodgson Pakistan – Renovation of Tablet Area
- Hameed Latif Hospital
- Aga Khan Hospital (Radiology)
- Getz Astola – OSD Building / Warehouse

### MALAYSIA

- F&N-PML Dairies Pulau Indah
- Infineon Technologies, Melaka
- Kotra Pharma (M) Sdn Bhd, Melaka
- Memc Electronic Materials, Ipoh
- Motorola Factory, Penang
- Hospital Gleneagles, Reversion KK
- Hospital KPJ
- Hospital Kuala Lumpur (MOH)
- Hospital Kuala Lumpur JKR (Women & Children)
- Hospital Sabah Medical Center, KK
- Hospital Tengku Ampuan Afzan, Kuantan
- Hospital Tengku Ampuan Rahimah, Klang
- Hospital Tung Shin, KL
- Hospital Umum, Sarawak (JKR)
- Hospital University Malaya Medical Centre, PJ (PPUM)
- Hospital USM, Kota Bharu Kelantan
- Mahkota Medical Centre, Melaka
- Jesselton Eye Surgery, KK
- Sime Darby Medical Centre, Subang Jaya (Ex-SJMC)
- Sunway Medical Centre, Subang

### SINGAPORE

- Institute Of Molecular And Cell Biology
- Fusionopolis Cleanroom
- SSMC Semiconductor
- Nuh Operating Theatre
- SGH Burn Operating Theatre
- Geh Operating Theatre
- National Heart Center
- Alcon ICT
- Amgen Pharmaceuticals
- Lonza Pharmaceuticals
- Biopolis Research Lab
- National Cancer Infectious Disease
- NUS Cleanroom Lab
- Ng Teng Fong Hospital

### AUSTRALIA

- Narrogin Hospital
- Northam Health Services
- Carousel Shopping Centre
- Kalgoorlie Hospital, Renal Ward
- Busselton Health Campus

### PHILIPPINES

- CMI Cleanroom
- Euro Med Cleanroom
- MRI Sez Compound
- NHK Cleanroom
- P1 & P3 Cleanroom
- NXP Semiconductor
- Monde Nissin
- Amkor Technologies
- Steroid Room Pharmaceuticals

### MYANMAR

- Myanmar Hospital Operating Theatre
- Mandalay Hospital

### VIETNAM

- Bio Safety Lab
- Asta Cleanroom Factory
- Vinh Hoan Cleanroom
- Institute Of Hygiene And Epidermiology
- SMC Cleanroom
- Bel Factory
- DHG Betalactam
- Imexpharm
- Medochemie
- Nanogen Pharmaceuticals
- National Institute For Control of Vaccine & Biologicals
- Nhat Nhat Pharmaceuticals
- Vaccin Nha Trang
- Vemedim Pharmaceuticals
- National University Cleanroom Lab

### THAILAND

- GPO Microbiological Laboratory
- KCE Technology Electronic Factory
- Phramongkutklao Hospital Anatomy Lab
- Hatyai Hospital Cath Lab
- Thammasat Hospital Cath Lab
- Rajvithi IVR CT Scan Room
- Siriraj Hospital (MRI and MRI)
- Phramongkutklao Hospital (OR and Labour Room)
- National Cyclotron and PET Centre
- Kasersart University Veterinary Teaching Hospital (OR and MRI)
- Bangkok Hospital HQ (MRI)
- Bangkok Hospital Hatyai (Negative pressure)
- Phuket Provincial Administrative Organization Hospital (OR)
- Songkhla Hospital (OR)

### BRUNEI

- Ripas Hospital Operating Theatre
- JPMC Jerudong
- Moh Kb Hospital
- Viva Pharmaceuticals

### INDONESIA

- Asahimas Beverage
- Kewpie
- Nestle
- Yakult
- Dankos Pharmaceuticals
- Ferron Pharmaceuticals
- Hisamitsu Pharmaceuticals
- Otto Pharmaceuticals
- PT Kimia Pharma
- Sari Enersis
- TFJ