

**GemCool**

# DMA SERIES

**MODULAR  
AIR HANDLERS  
1,200 - 38,000 CFM**



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## GEMCOOL PROFILE

In the ever evolving world of HVAC, GemCool offers tremendous customizability to offer the consumer maximum amount of options. Whether it is our Fan Coil units or our Air Handling Units, all requirements can be fulfilled by our technical personnel. Our computer selection program gives detailed technical information for the Air Handling Unit to allow easy selection and installation of equipment. The same technical selection software can also be used for selecting coil for fan coil units. With the increasing shift to district cooling, a major concern is the capability of the fan coil units to handle high water temperature rise. GemCool alleviates these concerns with the selection program which enables the engineer to select the appropriate units according to design conditions.

All GemCool equipment are manufactured according to strictest international standards to ensure highest quality and performance. Our DMA range of Air Handling All equipment is manufactured in our ISO certified factory. Our Air Handling Unit coils are made as per ARI standards and our fans are AMCA certified. The motors conform to the highest international electrical standards available. All our equipment are well insulated to prevent cold bridging.

# ISO CERTIFICATION

**BUREAU VERITAS**  
Certification



Certification

Awarded to

**GEMCOOL CORPORATION**

**P.O. BOX 120389, SHARJAH  
UNITED ARAB EMIRATES**

Bureau Veritas Certification certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standard detailed below

Standard

**ISO 9001:2008**

Scope of Certification

**DESIGN, MANUFACTURING AND SUPPLY OF  
AIR HANDLING UNITS.**

PERMITTED EXCLUSION(S)

7.5.2 – Validation of Processes for Production and Service Provision

Original Approval Date:

**25<sup>TH</sup> FEBRUARY 2009**

Subject to the continued satisfactory operation of the organisation's Management System,  
this certificate is valid until: **24<sup>TH</sup> FEBRUARY 2015**

To check this certificate validity please call **(+971 4 345 3560)**

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation

Date:

**22<sup>ND</sup> FEBRUARY 2012**

**FARHAN AHMED**

*Certification Manager, Bureau Veritas Dubai*

Certificate Number :

**IND12.1049U**

**Managing office:**

Bureau Veritas Certification  
211 Second Floor, Dune Center  
Al Diyafah Street, Dubai, UAE

**Certification office:**

Bureau Veritas Certification (India) Private Limited  
'Marwah Center' 6<sup>th</sup> floor, Krishanlal Marwah Marg  
Opp. Ansa Industrial Estate, off Saki Vihar Road  
Andheri (East) Mumbai – 400 072 India

BUREAU VERITAS  
CERTIFICATION (Holding) S.A.  
using the accreditation certificate  
number 008



**008**

**DMA SERIES**

# UNIT TESTING

## AHU MECHANICAL CHARACTERISTICS

As per the tests carried out by Eurovent using standards EN1886 and EN13053, following are the summarized results for the mechanical characteristics of GemCool AHU's :

- Casing strength (-400 Pa) -  $D1(M)$
- Casing strength (+700 Pa) -  $D1(M)$
- Casing air leakage (-400 Pa) -  $L1(M)$
- Casing air leakage (+700 Pa) -  $L2(M)$
- Filter bypass leakage -  $F6$
- Thermal transmittance -  $T2$
- Thermal bridging factor -  $TB2$
  
- Acoustical insulation

Octave Band	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Insertion Loss	11 dB	12 dB	13 dB	14 dB	19 dB	29 dB	34 dB

# GUIDE SPECIFICATIONS

## CONSTRUCTION

Structural frame is composed of extruded anodized aluminum profiles with excellent mechanical characteristics. The outer surface is prepainted to **RAL 9010** at 50-70 micron. The profile incorporates a **thermal break** to prevent heat transfer and to avoid condensation on the outer surface. The thermal bridging by standard EN 1886 for the unit is TB2 as measured by Eurovent using standard EN 13053. The profiles are connected to each other by means of nylon corner pieces. Due to the non conductivity and high strength of nylon, the joint maintains the AHU's thermal break continuity and mechanical strength. The strength of the casing by standard EN 1886 is D1(M) as measured by Eurovent using standard EN 13053.

**Double skin** construction is provided by sandwich type 50mm thick panels. The outer and inner skin of panels are of prepainted galvanized steel (conforming to ASTM 653A) painted to the same specification as the structural frame. Stainless Steel outer and inner skin is available as another option for hygienic units.

Panels are injected with environment friendly 40 kg/m<sup>3</sup> polyurethane insulation, which adds extra mechanical strength and rigidity to the panels. Polyurethane has excellent heat insulation and noise reduction properties along with meeting the **NFPA-90A** flame speed and smoke generation requirements. The overall calculated thermal transmittance for the panel is 0.38 W/m<sup>2</sup>K. The acoustical insulation of the panels as measured by Eurovent using standard ISO 3741 is as follows:

Octave Band	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Insertion Loss	11 dB	12 dB	13 dB	14 dB	19 dB	29 dB	34 dB

Panels are secured on the frame by means of stainless steel screws covered by PVC cups for aesthetic appearance and prevention of screw rusting. The service panels are fixed on the frame by special bolts that allow easy removal of panel without use of tools and eliminate air leakage. All panels are completely gasketed to promote an air tight construction and are completely removable for access to components.

Smaller units are supported on a 2.0 mm thick powder coated hot dipped galvanized steel frame to ensure unit stability and permit easy lifting and handling. Larger units are mounted on powder coated pregalvanized 5.0mm channels (conforming to ASTM A36) to give maximum strength and rigidity. In addition, holes are provided in the base frame to permit usage of lifting belts.

All modular sections are joined easily by the means of internal bolting system. The bases also come with a flange for quick assembly and maintaining a composite base. This quick system allows for prompt and air-tight assembly of different sections.

All required materials for assembly are provided with the unit and method of assembly is detailed in the operation and maintenance manual. In case of space limitations, sections can be completely dismantled and re-assembled at site.

All internal components of the units are secured on hot dip galvanized steel profiles for maximum longevity. These profiles are in turn bolted to the base profile. As an option, stainless steel profiles or powder coated hot dip galvanized profiles can be used for hygienic units.

## FAN MOTOR ASSEMBLY

Units are equipped with double inlet, double width, **centrifugal** fans or with free flow **plug** fans. The centrifugal fans can be forward curved type fans, backward curved fans or with airfoil profile blades. All fans are made from hot dip galvanized steel to prolong longevity. Backward and Airfoil fans have polyester powder coated impellers as standard. Fans are statically and dynamically **balanced** to ISO1940 and AMCA 204-G2.5 standards to prevent vibration. Fans are then trim balanced to ISO1940 and AMCA 204-G2.5 standards. Clean room application fans with a balancing grade of G1.0 are available on request.

Selection of fans are done to meet the specified air flow and static pressure at low outlet velocities and optimum motor safety factor. All air flows and corresponding static pressures and fan RPMs given by selection program are checked and verified by Eurovent to standard ISO 5801. In addition, the fan performance is certified to **AMCA** standard 210 and noise ratings are given according to AMCA standard 310. Fans can be supplied in different positional orientations according to the project requirements.

Shafts of the fan are manufactured from C45 carbon steel using an automatic turning process for positioning and cutting of keyways. Housings are made of galvanized steel and are attached to the side plates in "Pittsburg Lock" form system. Housings for high static pressure applications are welded.

The 3 phase induction motors are of totally enclosed fan cooled type (TEFC) with class F insulation and **IP 55** protection and comply with low voltage IEC standards. All motors are Variable Frequency Drive (VFD) compatible. Transmission is effected via V-belts and pulleys with taper lock bushing. Motors are mounted on sliding rails which permit shifting in two axis for easy and accurate positioning of the motor.

The whole fan and motor assembly is **isolated** from the unit frame by means of Spring anti-vibration isolators. The fan outlet is connected to the unit panel by means of **flexible** connection to ensure vibration-free operation. The fabric used in the flexible connection complies with NFPA 90A and NFPA 90B fire spread and smoke generation standards.



Fan bearings are self-aligning, sealed for life ball bearings requiring no maintenance. In addition to a service door, Gemcool also offers as an alternative a second door with net screen to eliminate use of a belt guard and prevent unauthorized people from touching moving parts. Other options for the fan section include stainless steel fans, explosion proof motors, standby motors, painted housings, 6 & 8 pole motors, dual speed motors etc.

## COILS

In order to offer true unit selection, coils are available with three different cooling medium - water, refrigerant and glycol. Standard water cooling coils are available from two to twelve rows. Circuiting is done by computer selection to keep the cooling media pressure as optimum as possible.

Coils are fabricated of 3/8" OD copper tubes. Fins are made of aluminum and are pressure bonded to the tubes through mechanical expansion. Fins are selected to provide maximum contact area while minimizing air pressure drop. Coils are encased in galvanized steel. Headers are made of seamless steel brazed to the tubes. All headers are covered with anti corrosion paint and are male BSP threaded to allow fast and secure connections. Air vents are provided on each header for water coils. Both headers are on the same side as the access for the fan and filter. All coils are pressure tested at a minimum pressure of 350 PSI.

All coil capacities are measured and verified by Eurovent to standard EN 1216. In addition, coils are rated in accordance to ARI 410. All coils are selected at a face velocity below 2.5m/s (500 fpm).

The drain pan is of double skin stainless steel construction with rubber insulation, and drain pipe. The whole coil and drain pan assembly slides on rails allowing easy access to the coil. The inlet and outlet headers along with the drain connection are sealed on the casing with neoprene gaskets. Droplet eliminators for cooling coils are made of special shaped aluminum profiles to secure drop elimination even in high air velocities and they are permanently fixed through spacers on a rigid frame.

Several options are available on coils such as copper headers, stainless steel headers, copper fins, heresite coated coils, expansion valve for DX coils etc.

## FILTER SECTION

Several filter options are available for installation in the AHU. All filters come in their own sections. They can be incorporated in other sections upon request. All filters are selected at face velocity below 2.5m/s. All filters rest on a framework of galvanized steel to guide and hold the filter in position. This kind of arrangement ensures low filter bypass and at the same time makes filter replacement easy. All filters sizes are standard and are easily available in the market.

Panel filters are one of the most commonly used filters and come in 2" (50mm) disposable cartridges enclosed in a metal frame. The filter media is synthetic and arranged as a vee bank to increase the effective surface area. They are available from grades EU-2 to EU-7. A wire grid maintains the uniform shape of the pleats to ensure uniform airflow and dust loading.

Bag filters are available from efficiency EU-6 to EU-9 and come in synthetic media. The standard depth of the bag filters is 600mm. However in case of space limitations or hospital applications, rigid type filters are also available. Other options include short 100m deep mini pleat bag filters.

For applications to reduce odor, carbon filters are available. These consist of panel filters or bag filters with the base media impregnated with activated carbon. Filters with higher carbon count are also available.

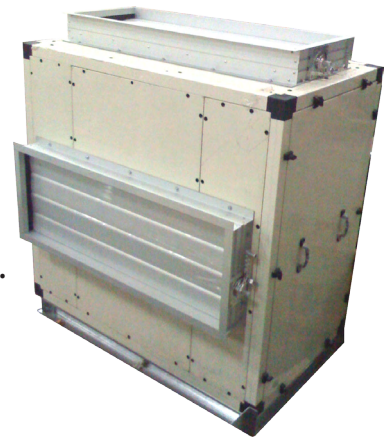
For the most demanding situations, AHU's may be fitted with HEPA filters. These start from grade MERV13 and extend to U17. Depending on the type of application, an appropriate filter grade can be chosen. HEPA filters come as cartridge type and are enclosed by an aluminum frame to maintain rigidity. A special frame is used to mount the filter to reduce the air bypass. As an option, HEPA filters can come in stainless steel frames.

In case the pressure drop across the filters needs to be monitored, pressure differential manometers can be mounted on the filter section. These can be connected directly to BMS systems or can give a readout as required.

## MIXING BOX

The mixing box section is equipped with opposed action dampers of various sizes for fresh air, return air and exhaust air that can be linked together or operate independently. The damper system permits the use of 100% fresh air with 100% exhaust air or any custom combination as per design requirements. Double mixing boxes that can mix more than two sources of air are also available.

Dampers are of opposed operation activated by means of special tooth-gear, made of glass reinforced nylon, having high mechanical strength and limitless life duration. Blade bearing are made of the same high strength material and do not require any lubrication. Damper blades are made of aluminum extrusion and incorporate gaskets at the edges and end to maintain tight closure. Links are provided for manual or motorized operation. In addition, other accessories such as sand trap louvers, attenuators can also be attached at the inlet.





## HEAT RECOVERY SECTION

With tremendous focus on heat recovery, Gemcool strives to meet international standards of heat recovery by incorporating multiple heat recovery technologies aimed at reducing energy wastage and increasing cost effectiveness. The different systems used are:

- Regenerative Rotating Heat Exchanger (Thermal Wheel)
- Liquid Coupled heat exchanger (Run Around Coil)
- Gas driven wrap around coil (Heat Pipe)

### *Regenerative Rotating Heat Exchanger (Thermal Wheel)*

The rotating heat exchanger consists of a thermal wheel that rotates at a slow speed and transfers both latent and sensible heat from the fresh air to the exhaust air to lower the temperature and humidity content of the fresh air.

The thermal wheel is of hygroscopic type, made of fire proof materials, consisting of an assembly of smooth and corrugated strips of specially treated aluminum foil, creating a number of axial passages through which the air flows. The desiccant can be molecular sieve or of silica gel. Both systems are designed to maximize heat transfer while keeping cross contamination to a minimum.

The drive unit consists of a geared electric motor and chain drive. On side of the casing will be provided with removable access panel to allow inspection, maintenance and withdrawal of the heat wheel assembly.

### *Liquid Coupled heat exchanger (Run Around Coil)*

The run around system consists of two coils joined together by a piping system and a pump circulating water through the system. The two coils sandwich the main cooling coil. When warm air comes in contact with one coil, it heats the water and this water is circulated to the other coil which is in contact with cool air from the cooling coil. The warm water heats up the cool air reducing the temperature and relative humidity of the air. This results in dual energy savings by reducing the amount of energy required to cool the air and energy required to heat the air. All Run Around Coils are normal coils requiring little maintenance, offering easy replacement and low cost benefits.

### *Gas driven wrap around coil (Heat Pipe)*

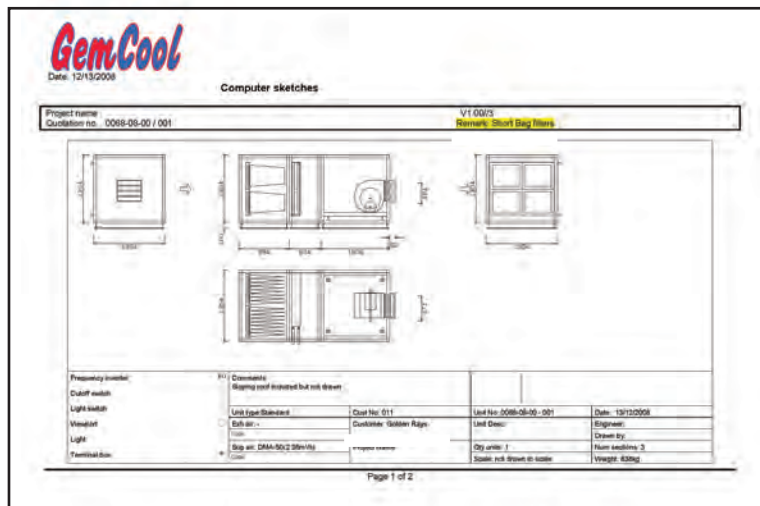
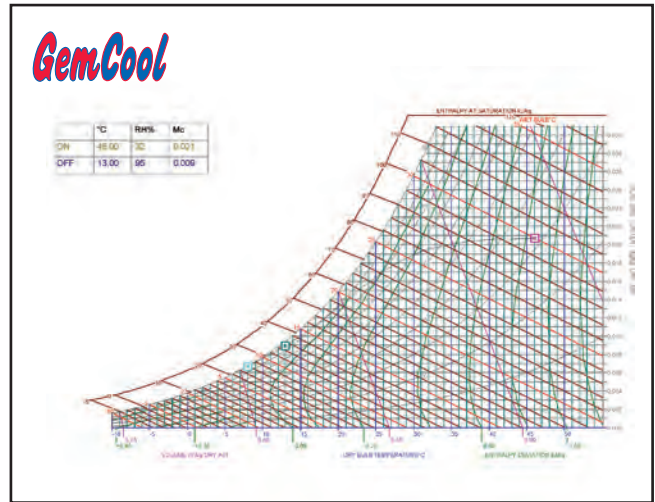
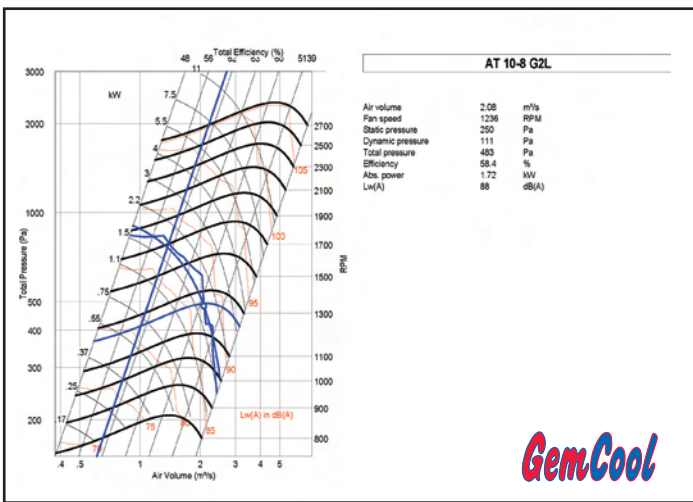
The heat pipe system is similar to the run around coil with the difference being that the circulating medium is refrigerant gas and the setup does not require an external "driver" such a pump. The medium circulates around due to difference in media density induced by temperature differentials. Heat pipes are sourced from major international suppliers meeting stringent manufacturing standards.

## OPTIONAL ACCESSORIES

A great variety of optional accessories is available upon request like rain covers, canopies, inspection windows, electric elements, motors for dampers, bulkhead inspection lamps etc.

# COMPUTER SELECTION

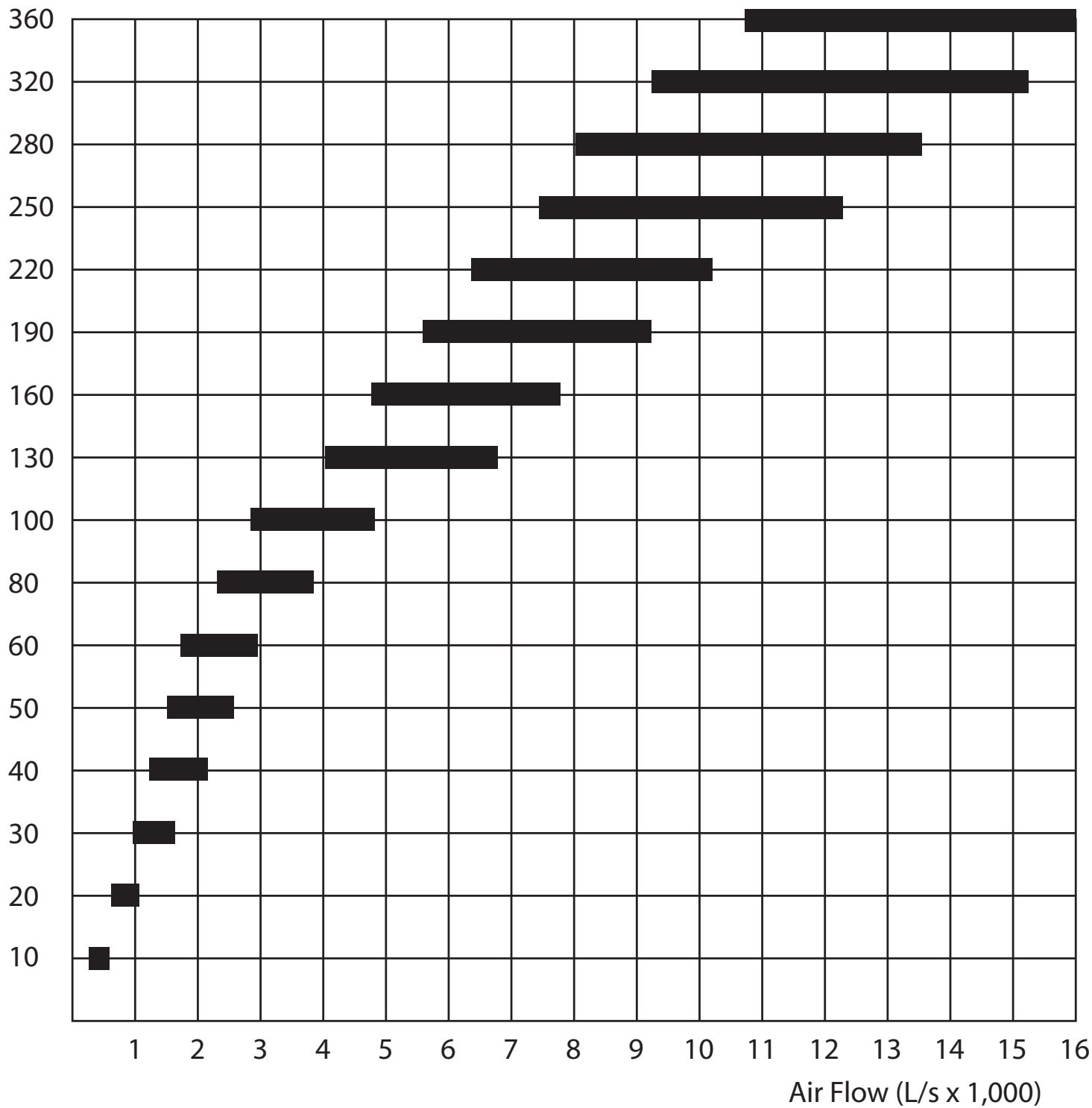
To provide our customers with detailed technical information about the unit, GemCool has developed a special selection program. This selection program allows the user to select all characteristics of the unit and change them as per specified requirements. It also allows the user to see technical data associated with each component of the AHU. For example, the user can see the fan curve related to the unit. Or the coil psychrometric chart can be displayed for each coil selection. After each selection of the unit, a printout is generated containing the technical data, a sketch and any other printouts the user requests. The selection program can be used to select the optimum unit and all the relevant data can be sent to GemCool who can start production of the unit. The selection program has been checked and verified by Eurovent for technical viability.



# QUICK SELECTION

DMA SERIES



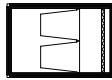


UNIT SIZE



Notes:

- 1) All units are selected at maximum coil face velocity of 2.5m/s and minimum of 1.5m/s.
- 2) In case higher airflows are desired from a particular model, droplet eliminators may be used to increase maximum airflow. Droplet Eliminators allow a coil face velocity upto 3.0m/s.
- 3) Direct Expansion (DX) coils should have coil face velocity above 1.75m/s.






# DIMENSIONS

UNIT SIZE  DMA	UNIT HEIGHT & WIDTH		FAN SECTION	COIL SECTION	FILTER SECTION	MIXING BOX SECTION	THERMAL WHEEL SECTION
	HEIGHT	WIDTH					
10	804	804	1,004	604	954	654	504
20	954	954	1,204	604	954	704	504
30	1,104	1,104	1,204	604	954	704	504
40	1,104	1,354	1,404	604	954	704	504
50	1,304	1,354	1,406	604	954	754	604
60	1,404	1,404	1,506	604	954	904	604
80	1,554	1,554	1,506	604	954	1,004	604
100	1,704	1,704	1,606	604	954	1,004	704
130	1,904	2,004	1,806	604	954	1,004	704
160	2,104	2,104	2,006	604	954	1,306	704
190	2,254	2,254	2,206	604	954	1,306	704
220	2,354	2,354	2,358	804	954	1,406	704
250	2,504	2,604	2,358	804	954	1,506	704
280	2,504	2,804	2,508	804	954	1,606	804
320	2,804	2,804	2,658	804	954	1,706	804
360	3,004	3,004	2,808	804	954	1,806	804

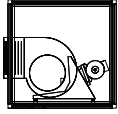
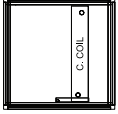
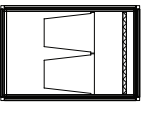
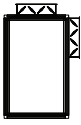

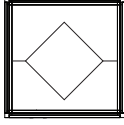
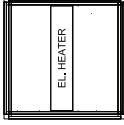
**NOTES:**

- 1) All dimensions are in mm. They can be reduced upon request.
- 2) Unit section dimensions can differ according to the components installed.
- 3) For more options, please contact one of our Engineers for a computer selection.

# DIMENSIONS

UNIT SIZE  DMA	UNIT HEIGHT & WIDTH		PLATE HEAT EXCH SECTION	ELECTRIC HEATER	DOUBLE MIXING BOX SECTION	DOUBLE MIXING BOX SECTION	HOT WATER COIL SECTION
	HEIGHT	WIDTH					
10	804	804	1,004	604	704	1,204	604
20	954	954	1,004	604	804	1,404	604
30	1,104	1,104	1304	604	804	1,404	604
40	1,104	1,354	1,304	604	804	1,404	604
50	1,304	1,354	1,406	604	904	1,606	604
60	1,404	1,404	1,606	604	1,004	1,806	604
80	1,554	1,554	1,606	604	1,104	2,006	604
100	1,704	1,704	1,806	604	1,104	2,006	604
130	1,904	2,004	1,806	604	1,104	2,006	604
160	2,104	2,104	2,006	604	1,406	2,606	604
190	2,254	2,254	2,206	604	1,406	2,606	604
220	2,354	2,354	2,358	904	1,506	2,806	804
250	2,504	2,604	2,358	904	1,606	3,006	804
280	2,504	2,804	2,508	904	1,706	3,206	804
320	2,804	2,804	2,658	904	1,806	3,406	804
360	3,004	3,004	2,808	904	1,906	3,606	804

# WEIGHT

UNIT SIZE	FAN SECTION	COIL SECTION	FILTER SECTION	MIXING BOX SECTION	THERMAL WHEEL SECTION	PLATE HEAT EXCH	ELECTRIC HEATER
DMA							
10	135	94	90	85	150	165	77
20	190	119	114	95	196	214	93
30	216	140	129	95	230	247	109
40	280	169	146	95	264	297	128
50	311	189	153	125	308	340	136
60	361	205	159	140	337	374	154
80	433	242	191	161	447	477	173
100	502	281	208	173	534	574	197
130	641	360	253	195	651	697	244
160	761	430	253	261	716	766	283
190	843	489	294	282	864	914	318
220	1,110	560	306	312	916	976	378
250	1,313	678	334	377	1,011	1,071	446
280	1,374	735	352	414	1,089	1,148	479
320	1,567	806	392	446	1,185	1,254	519
360	1,781	904	452	502	1,309	1,390	575

**NOTES:**

- 1) All figures are in kg.
- 2) All weights are static. Coil weight does not include water weight
- 3) Weights are approximate only. For exact figures, please contact your nearest GemCool representative.

Boem

Bool