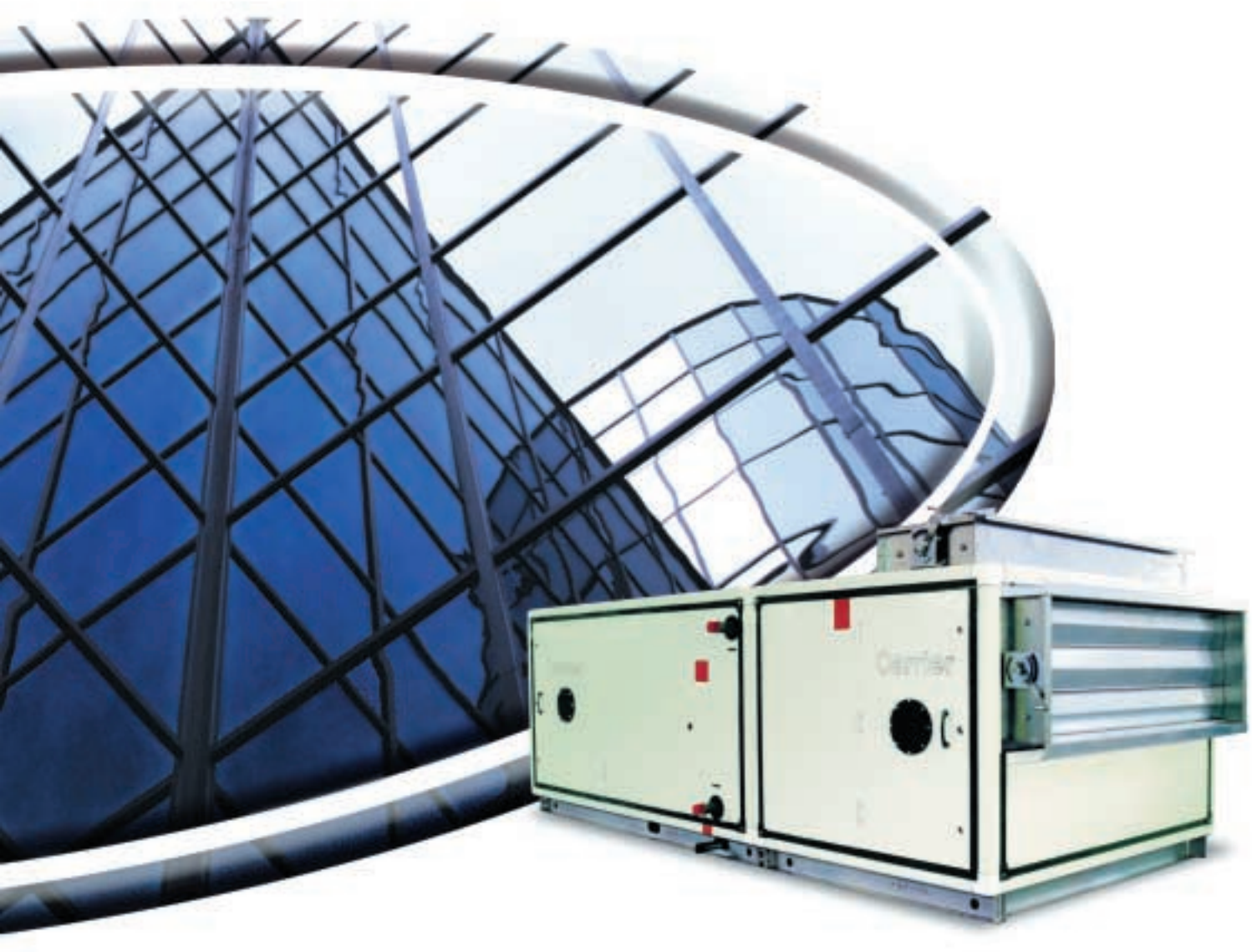
Carrier

Central Air Handling Unit

39CBF

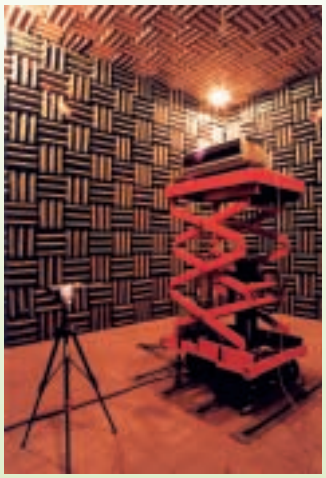


Cold Bridge Free

A NEW CONFORMANCE
TO QUALITY AND STANDARD

Shanghai Tonghui – Carrier Air Conditioning Equipment Co., Ltd.

- Established in January 1987. Tonghui Carrier is the biggest and the most advanced airside manufacturer in China.
- Well equipped with advanced heat performance laboratory, noise level laboratory and fan performance laboratory.
- The factory focused on the manufacturing of air handling units and terminal units.
- Products strictly abide by the international ARI standard of the United States and JIS standard of Japan.
- Attained its ISO9001:2000 in 2001 and ISO14001:1996 in 2001.
- Member of the top 500 industrial enterprises in China.
- Product honoured as the "Energy Saving Product" of Shanghai.
- Praised the highest quality globally with the "Willis Carrier Award" in 1997.



CONTENT

Model Number Nomenclature

39 CBF 07 12

Model Series

39 - Central Air Handling Unit

Style

CBF - Cold Bridge Free unit casing construction

Module Dimensions

Unit Height -Dimension in Module Unit, 07 refers to 7 module units

Actual unit height = module unit x 100 + Frame + Base Channel

= 7 x 100 + 110 + 100 = 910 mm

Unit Width -Dimension in Module Unit, 12 refers to 12 module units

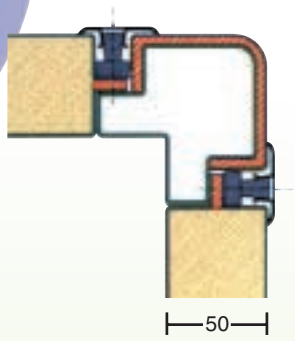
Actual unit width = module unit x 100 + Frame

= 12 x 100 + 110 = 1310 mm

39CBF Technical Table	
Standard Model Range	610 L/s to 16,050 L/s
Panel Material	Thermally isolated double skinned 0.8mm outer skin and 0.8mm inner skin
Panel Insulation Material	Polyurethane with thermal conductivity 0.02W/mK
Panel Thickness	50 mm
Frame Material	1.2mm galvanized steel with thermal break
External Panel Finish Colour	White or Blue
Inside Panel Finish Colour	White
Base Channel	galvanised steel base frame
Standard Fan	Double inlet double width, backward curved blade or forward curved blade
Fan Bearing	Pillow block ball bearings
Drive Arrangement	Internally mounted with belt and pulley transmission
Vibration Isolation	Spring or rubber isolated fan & drive mounting with fire rated fan discharge canvas
Motor Mount	Motor on adjustable track with locking bolt
Motor Type	Motor protection IP54 or IP55 Class B or F
Coil Material	Galvanised steel coil frame with copper tube and aluminum wavy fin
	Optional coated fin is available for adverse environment
Coil Header	Steel header with rust proof coating finish or copper header
Drain Pan	Fully insulated galvanised or stainless steel drain pan
Air Dampers	Airfoil sectioned opposed blade with vinyl sealing strip
Damper Bearing	Double sealed copper bearing
Access Door	Hinged door with key latch and glass pot hole
Filter Track	Clip on housing frame or optional quick slide track

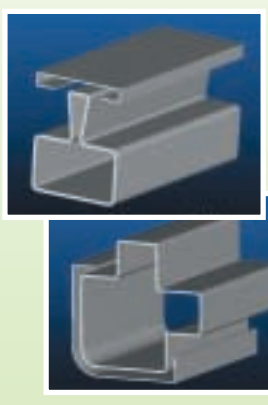
Increasing concern on building health and new ventilation requirements have made indoor air quality (IAQ) one of the primary considerations in today's HVAC equipment selections. For air handlers, effective filtration, leak prevention and preservation of thermal breaks are critical.

The CBF (Cold Bridge Free) unit construction combines complex technology with clean, elegant design. The patented sealed double-wall insulation system leads the industry with superior thermal performance. This prevents the condensation that causes many air handlers to "sweat". With sealed panels and no exposed insulation fibres, your indoor quality is not compromised.



Cold Bridge Free Construction

In location where the air handler is handling air with a large temperature difference between inside and outside, there is a risk of surface condensation on the inside and the outside of the unit. CBF's unique design and insulation system has eliminated the metal to metal contact between inner and outer surfaces that causes the surface condensation. The 50mm thick CBF casing panels rest against ultra-tight seals – and no leakage path for air to escape. It is the quality and efficiency expected only from very high-end, custom air handlers.



FEATURES AND APPLICATIONS

Fan

Fan casing is manufactured from heavy gauge steel sheets and angle stiffeners to form a rigid housing to withstand maximum operating pressure. Fan inlet is in the form of circular volute cone. All fan wheels and factory-supplied pulleys are dynamically and statically balanced, and tested for over speed before leaving factory. The fan shaft is made from solid steel and mounted with self-aligned plummer block ball bearings rated for a minimum of 100,000 hours.

Forward Curved impeller constructed from galvanised steel sheets is designed to meet high volume, medium static pressure and low-speed operation. Backward curved impeller is made from solid steel with enamel paint finish. Typical application is in medium to high static pressure, non-overloading and high-speed operation. Other fan type of different characteristics may be custom selected and built to meet specific requirements.

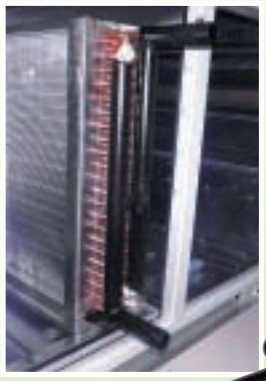
Fan Isolation

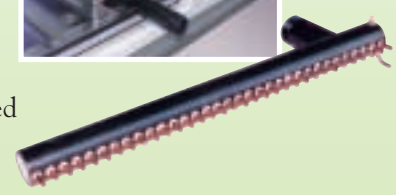
Fan housing and drives are mounted on one single chassis with spring or rubber anti-vibration isolators. Vibration isolators are individually sized to match the power/weight ratio of whole fan assembly for maximum isolation. Special imported fire rated canvas material is used for fan discharge flexible connection to eliminate vibration transmission to ductwork.

Motor and Drives

Standard belt driven arrangement shall have motor mounted on adjustable track with locking bolts to prevent undue vibrations. Factory supplied motor shall be ABB or of equal quality standard. Motor shall be typically rated at minimum of 1.2 times of fan shaft brake power.

Coil





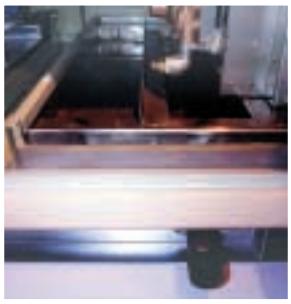
Both Cooling coil and Heating coil are constructed from copper tubes expanded on to aluminium fins. The whole assembly is held firmly within a heavy gauge galvanised frame. The complete coil header is mounted inside the unit hand painted with corrosion resistance treatment after brazing. Each coil is individually tested at factory with 28 bar air pressure to assure reliability. Drain plug and venting plug are provided for every coil to assure complete drainage. The whole coil assembly is rest on sliding track for easy removal.

Special coated fins are available for application in adverse air conditions.

Coil selection is calculated by Carrier's own software program, the "AHU Designer", to obtain the optimal coil configuration that meets the specified cooling performance.

Drift Eliminators

Water carry over typically occurs when velocity reaches 2.5m/sec. The CBF units can be fitted with corrosion-proofed aluminium eliminators on galvanised frame to avoid moisture carry over. For application where heavy condensation is anticipated on chilled water coil, the eliminator would be highly recomended even at lower velocities.



Drain Pan

Standard Drain Pan shall be galvanised steel, fully insulated on the outside with 25mm foam insulation. Connecting pipe is located at bottom of drain pan to allow complete drainage. The drain pipe exits from the same side as coil header.

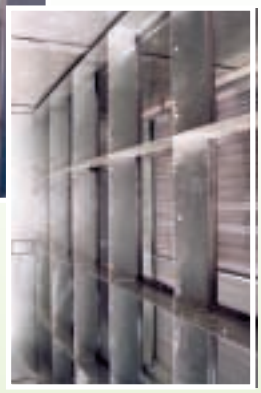
Noise & Attenuation

The fan component is the major sources of sound transmitted through the HVAC system. Effort should be made at the beginning to minimize the magnitude of this sound. Carrier's AHU Designer software is able to select the optimal fan to operate at or near peak efficiency; this will result in minimum sound power levels.

Different choice of air volume control would also have different impact to the resultant noise. While each will have its merit, but they must be chosen with consideration of sound.

The sturdy construction of CBF offers superb barrier to shield break out noise to the surrounding. The sound reduction index on the unit casing is tested to meet EN1886 European standard.

Air Filtration



The standard CBF features Clip-on type filter housing frame that meets the stringent requirements of filter bypass leakage rate. For application where space and unit length are critical CBF can offer alternative of slide in filter track for side access.

CBF offers a variety of filter media to suit all kinds of applications. Filter housing is built to fit a variety of primary and secondary filters. Dimension grid is scaled to meet international recognised filter cell sizes.

Mixing Dampers

Aerodynamically designed damper blades have built in high quality bearings. Blade edges are lined with sealing strip to restrict leakage to an absolute minimum. Air damper blades are either linked to give parallel turning operation or gear set to give opposing direction. The dampers are tested to yield linear control characteristic. Mixing dampers working in pairs may be coupled in such a way that if one is 75% open the other is 25% open.

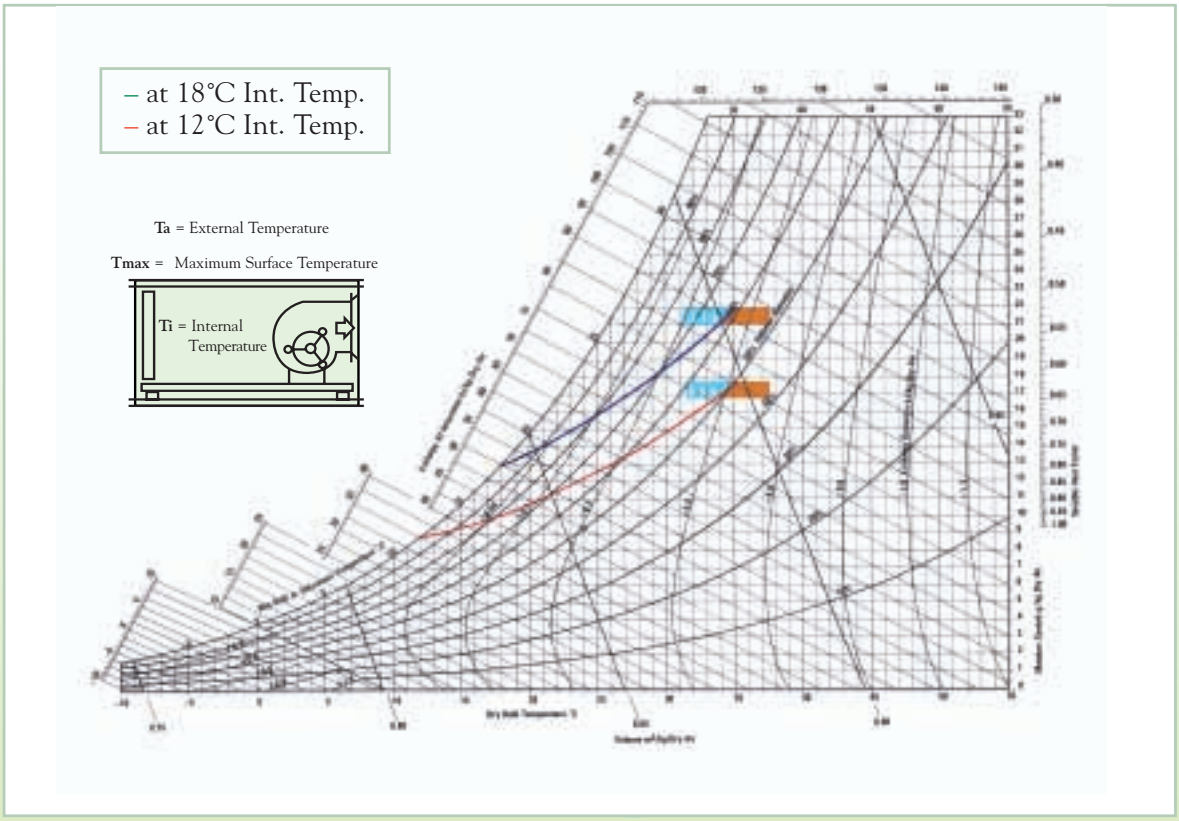
Cold Bridge Free Casing Performance

On the outside, CBF's revolutionary casing is the unit's most obvious feature. Its clean lines elegantly packaged the unit's sealed double wall system are galvanized, pre-painted steel both inside and out to protect the unit from the formation of unsightly "white rust," which could also contaminate indoor air quality.

CBF's sealed double-wall insulation system has superior thermal performance and prevents the formation of condensation on the exterior of the unit. Performance is tested to international standard and in strict accordance with Eurovent prEN1886.

Thermal Bridge Performance Table

	Internal Temp (Ti) 12°c		14°c		16°c		18°c	
External Temp (Ta)	Tmax	RH%	Tmax	RH%	Tmax	RH%	Tmax	RH%
34	25.4	50%	26.2	55%	27.0	58%	27.8	62%
32	24.2	53%	25.0	57%	25.8	62%	26.5	65%
30	23.0	55%	23.8	60%	24.5	64%	25.3	69%
28	21.8	58%	22.5	63%	23.3	68%	24.1	73%
26	20.5	61%	21.3	66%	22.1	71%	22.9	77%
24	19.3	65%	20.1	70%	20.9	76%	21.7	82%
22	18.1	69%	18.9	75%	19.7	81%	20.4	87%
20	16.9	74%	17.7	80%	18.4	86%	19.2	93%
18	15.7	78%	16.4	86%	17.2	93%	18.0	100%
16	14.4	85%	15.2	92%	16.0	100%		
14	13.2	92%	14.0	100%				
12	12.0	100%						



Rating and Standard

CBF is design and built to meet international standard. The unit is tested by the "China National Accreditation of Laboratories" CNACL. All ratings below are verified by CNACL to conform to the equivalent of prEN1886 – the European standards for air handling units used for ventilation and air conditioning of buildings for human comfort.

EN1886 : European classifications for air handling units

Thermal Bridging Factor – Kb
measure of maximum external surface difference to the air to air temperature difference

Class TB1	0.75 < Kb <= 1	
Class TB2	0.6 < Kb <= 0.75	**39CBF**
Class TB3	0.45 < Kb <= 0.6	
Class TB4	0.3 < Kb <= 0.45	
Class TB5	No Requirements	

Maximum Air Leakage Rate of Casing, at 400Pa negative test pressure - L($L.s^{-1}m^{-2}$)
measure of total air leak not exceeding Maximum Leakage Rate at 400Pa internal negative pressure

		Filter Class (EN 779)	
Class B	Ln <= 0.44	F8-9	**39CBF**
Class A	Ln <= 1.32	F5-7	
Class 3A	Ln <= 3.96	G1-4	

Thermal Transmittance – U($W.m^{-2}K^{-1}$)
measure of thermal transmittance across the unit casing at the steady state temperature difference of 20K

Class T1	U <= 0.5	
Class T2	0.5 < U <= 1	
Class T3	1 < U <= 1.4	**39CBF**
Class T4	1.4 < U <= 2	
Class T5	No Requirements	

Acceptable Filter Bypass Leakage Rate – k (%)
acceptable total bypass leakage around filter cells, at 400Pa test pressure

Class F9	k <= 0.5	
Class F8	k <= 1.0	**39CBF**
Class F7	k <= 2.0	
Class F6	k <= 4.0	
Class F5	k <= 6.0	
Class G1-4	No Requirements	

Maximum Air Leakage Rate of Casing, at 700 Pa positive test pressure – Lp($L.s^{-1}m^{-2}$)
measure of total air leak not exceeding Maximum Leakage Rate at 700Pa internal positive pressure

Class B	Lp <= 0.63	**39CBF**
Class A	Lp <= 1.9	
Class 3A	Lp <= 5.7	

Mechanical Strength in Relative Deflection – D ($mm.^{m-1}$)
maximum deflection of any span of the panels and/or frames shall not exceed the limits in table

		Withstand max fan pressure	
Class 2A	D <= 4	Yes	**39CBF**
Class 2	D <= 4	No	
Class 1A	D <= 10	Yes	
Class 1	D <= 10	No	
Class 1B	No Requirements	Yes	

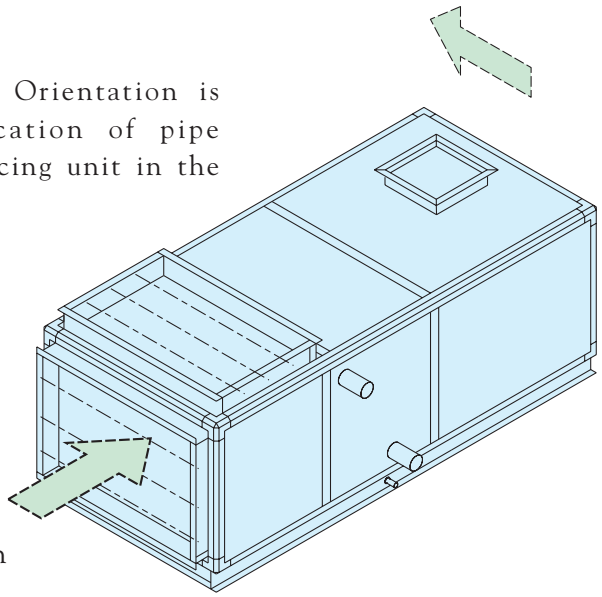
STANDARD COMPONENTS

Unit Section		Section Length (M: Module Quantity)	Remark
Mixing Chamber		0609-0813 (5M) 0914-1317 (6M) 1518-1622 (8M) 1822-2025 (9M) 2226-2334 (11M)	
Bag Filter		6M	6M access section is recommended at upstream
Combined Filters		6M	6M access section is recommended at upstream
Cooling Coil		6M	Drift eliminator may be included
Hot Water coil		3M	
Steam Coil		3M	
Electric Heating Coil		3M	
Steam Humidifier		6M	
Evaporative Humidifier		3M	May be installed in cooling coil section
Spray Humidifier		6M	Section includes drift Eliminator
Fan		Refer to fan table	Four discharge configurations available
Combined Mixing Chamber		(0609-0813) 10M (0914-1317) 12M (1518-1622) 16M (1822-2025) 18M (2226-2334) 22M	
Attenuator		6M, 12M	6M Access section is recommended at upstream
Discharge		0609-0813 (5M) 0914-1317 (6M) 1518-1622 (8M) 1822-2025 (9M) 2226-2334 (11M)	Available discharge location at top, front or side
Plenum/Access		3M, 6M, 9M	

Note: *one Model = 100mm
Module length exclude dimensions of Frame and Post

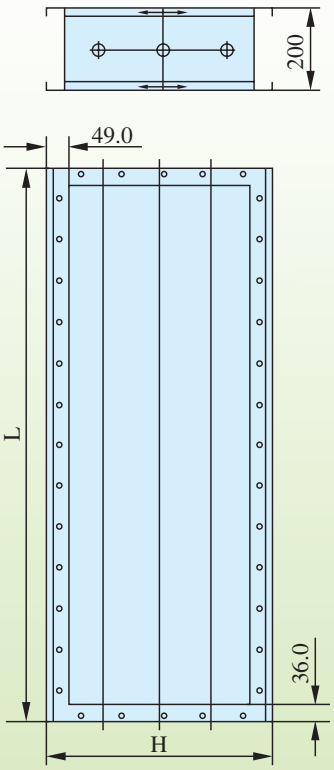
Unit Orientation

Unit Handling Orientation is determined by location of pipe connection while facing unit in the direction of air flow



Mixing Damper

Standard Damper Dimensions



Unit Size	LxH mm	Weight kg
0609	886.0 x 420.5	20.7
0610	986.0 x 420.5	21.9
0712	1186.0 x 420.5	25.0
0813	1286.0 x 420.5	26.6
0914	1386.0 x 578.0	38.5
1015	1486.0 x 578.0	40.4
1016	1586.0 x 578.0	42.0
1117	1686.0 x 578.0	44.8
1317	1686.0 x 578.0	44.8
1518	1786.0 x 735.0	48.3
1522	2186.0 x 735.5	65.5
1622	2186.0 x 735.5	65.5
1822	2186.0 x 893.0	75.6
1824	2386.0 x 893.0	80.6
1825	2486.0 x 893.0	83.5
2025	2486.0 x 893.0	83.5
2226	2586.0 x 1050.5	94.2
2330	2986.0 x 1050.5	105.7
2334	3386.0 x 1050.5	116.6

Cooling Coil Performance

UNIT SIZE	AIR VOLUME at 2.5 m/s (L/S)	COIL FACE AREA (SQM)	ENT. AIR: 26.6°C DB / 19.4°C WB ---ENT.WATER: 7°C							
			4 ROWS (472FPM)				6 ROWS (472FPM)			
			C.Cap (kW)	Circuit	W-TEMP. RISE°C	W. Press Drop (kPa)	C.Cap (kW)	Circuit	W-TEMP. RISE °C	W. Press Drop (kPa)
0609	614	0.24	11.4	HF	5.5	4.5	15.5	HF	5.5	9.5
0610	849	0.34	16.5	HF	5.5	7.0	22.1	HF	5.5	14.5
0712	1227	0.49	25.1	HF	5.5	12.7	33.0	HF	5.5	25.5
0813	1746	0.70	36.6	HF	5.5	18.4	47.7	HF	5.5	36.2
0914	2029	0.81	42.9	HF	5.5	21.7	50.2	FL	5.5	12.7
1015	2619	1.05	56.2	HF	5.5	28.8	66.0	FL	5.5	18.6
1016	2879	1.15	62.7	HF	5.5	35.0	73.9	FL	5.5	23.3
1117	3587	1.44	69.5	FL	5.5	9.5	93.3	FL	5.5	18.8
1317	4200	1.68	80.9	FL	5.5	10.4	108.9	FL	5.5	20.4
1518	5191	2.07	101.3	FL	5.5	13.9	135.7	FL	5.5	26.9
1522	5899	2.36	118.5	FL	5.5	19.1	146.6	DB	5.5	22.6
1622	6371	2.55	128.8	FL	5.5	21.6	159.1	DB	5.5	25.9
1822	7315	2.93	148.4	FL	5.5	12.8	195.8	FL	5.5	25.3
1824	8259	3.30	171.2	FL	5.5	17.1	224.1	FL	5.5	33.4
1825	8967	3.59	188.9	FL	5.5	20.8	233.2	DB	5.5	19.9
2025	9911	3.96	208.1	FL	5.5	17.3	271.0	FL	5.5	34.3
2226	11563	4.63	245.3	FL	5.5	20.6	302.6	DB	5.5	18.3
2330	13686	5.48	295.1	FL	5.5	27.3	363.6	DB	5.5	24.8
2334	16046	6.42	353.8	FL	5.5	39.6	434.7	DB	5.5	35.7

UNIT SIZE	AIR VOLUME at 2.5 m/s (L/S)	COIL FACE AREA (SQM)	ENT. AIR: 33°C DB / 28°C WB ---ENT.WATER: 7°C							
			4 ROWS (472FPM)				6 ROWS (472FPM)			
			C.Cap (kW)	Circuit	W-TEMP. RISE°C	W. Press Drop (kPa)	C.Cap (kW)	Circuit	W-TEMP. RISE°C	W. Press Drop (kPa)
0609	614	0.24	29.0	HF	5.5	16.5	37.0	HF	5.5	31.4
0610	849	0.34	41.2	HF	5.5	13.6	47.7	FL	5.5	13.6
0712	1227	0.49	54.7	FL	5.5	14.2	71.5	FL	5.5	26.2
0813	1746	0.70	80.2	FL	5.5	25.0	97.6	DB	5.5	29.9
0914	2029	0.81	94.0	FL	5.5	32.0	114.5	DB	5.5	39.5
1015	2619	1.05	113.1	FL	7	27.4	139.1	DB	7	35.0
1016	2879	1.15	126.6	FL	7	34.3	147.8	DB	8	31.0
1117	3587	1.44	160.6	FL	7	24.7	196.9	DB	7	27.5
1317	4200	1.68	186.9	FL	7	28.1	229.5	DB	7	33.2
1518	5191	2.07	221.2	FL	8	27.9	272.8	DB	8	34.2
1522	5899	2.36	257.9	FL	8	37.9	302.7	DB	9	34.2
1622	6371	2.55	280.2	FL	8	43.2	312.6	DB	10	29.7
1822	7315	2.93	322.9	FL	8	23.3	358.7	DB	10	13.6
1824	8259	3.30	372.0	FL	8	31.0	416.1	DB	10	18.3
1825	8967	3.59	410.5	FL	8	37.9	460.4	DB	10	22.5
2025	9911	3.96	451.9	FL	8	30.2	506.0	DB	10	16.5
2226	11563	4.63	532.7	FL	8	36.4	597.1	DB	10	20.5
2330	13686	5.48	581.8	FL	10	30.3	721.4	DB	10	28.0
2334	16046	6.42	700.8	FL	10	44.3	865.8	DB	10	40.7

Note: The above performance are for reference only, and may deviate from latest development. Please contact your local Carrier sales representative for detail and updated selections.

Coil Weight and Connection

Net Coil Weight

(kg)

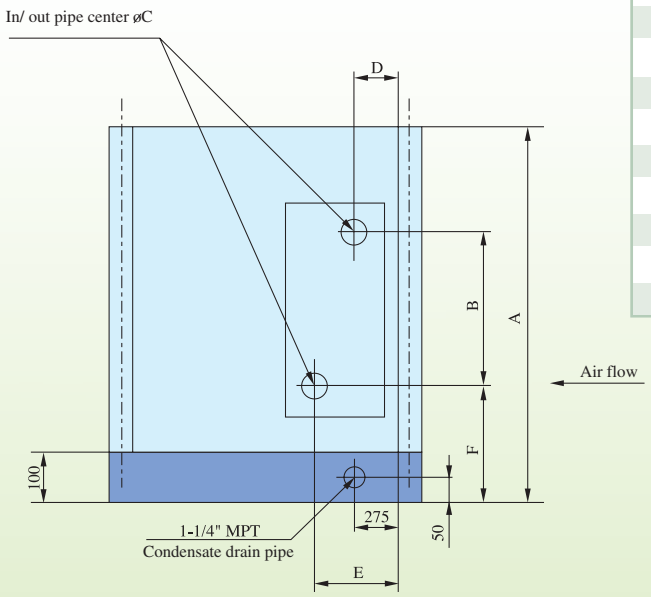
Unit Size	# of Row			
	2R	4R	6R	8R
0609	35.30	73.16	77.70	83.92
0610	40.30	78.42	84.62	92.77
0712	42.60	89.86	98.80	104.68
0813	47.36	97.27	108.26	122.00
0914	51.30	103.46	115.90	131.38
1015	54.00	114.76	131.21	151.08
1016	56.36	119.38	137.55	159.12
1117	64.01	131.26	153.89	180.26
1317	69.90	142.88	169.35	187.94
1518	75.53	160.33	193.00	230.45
1522	111.54	178.95	217.85	256.74
1622	116.32	187.78	228.89	271.11
1822	124.14	204.02	252.26	300.51
1824	128.02	226.15	273.16	327.49
1825	129.86	228.14	288.05	347.01
2025	136.98	254.93	319.51	384.74
2226	166.16	284.69	359.83	435.83
2330	188.06	323.33	412.93	504.93
2334	206.11	363.44	468.24	576.24

Note: Coil weight does not include unit section

Coil pipe connection

(mm)

Unit size	A	B	F	øC
0609	810	357	233	1-1/2" MPT
0610	810	421	233	1-1/2" MPT
0712	910	484	233	1-1/2" MPT
0813	1010	611	233	1-1/2" MPT
0914	1110	675	233	1-1/2" MPT
1015	1210	802	233	1-1/2" MPT
1016	1210	802	233	1-1/2" MPT
1117	1310	917	240	2" MPT
1317	1510	1107	240	2" MPT
1518	1710	1298	240	2" MPT



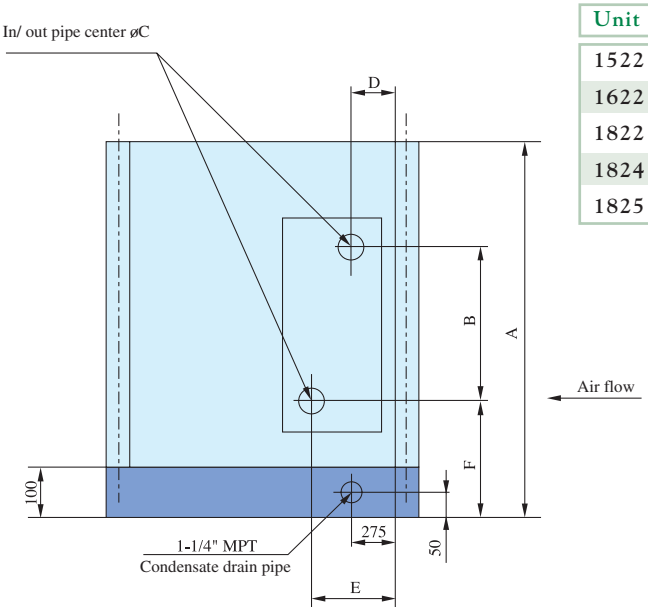
Note: MPT=External pipe thread

(mm)

	D	E
2 Row*	55	138
4 Row	91	173
6 Row	63	201
8 Row	88	226

* 2 row coil with 1/2" MPT connection for hot water heating.

Coil Weight and Connection (cont'd)



(mm)

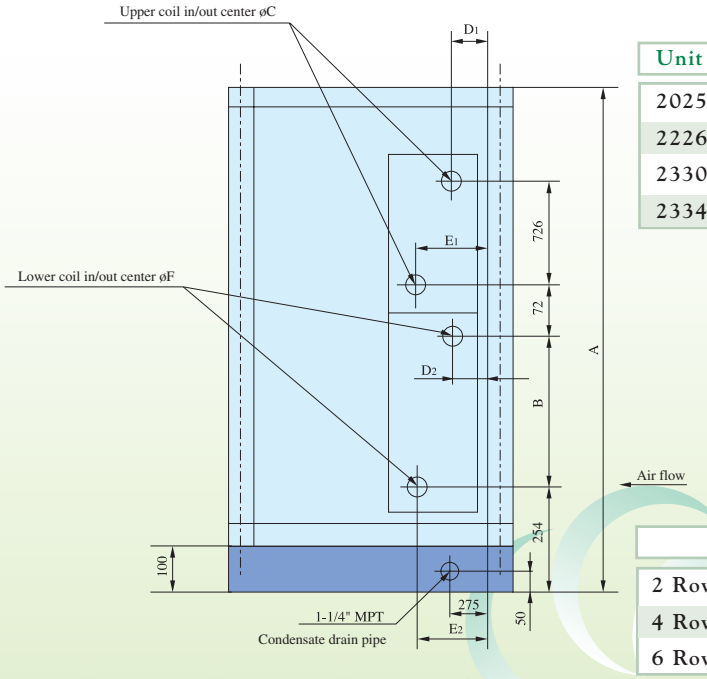
Unit size	A	B	F	øC
1522	1710	1298	240	2" MPT
1622	1810	1361	240	2" MPT
1822	2010	1523	254	3" MPT
1824	2010	1523	254	3" MPT
1825	2010	1523	254	3" MPT

(mm)

	D	E
2 Row*	55	138
4 Row	116	198
4 Row	88	226
6 Row	88	226

* 2 row coil with 1/2" MPT connection for hot water heating.

Note: MPT=External pipe thread



(mm)

Unit size	A	B	øC	øF
2025	2210	982	2" MPT	3" MPT
2226	2410	1173	2" MPT	3" MPT
2330	2510	1300	2" MPT	3" MPT
2334	2510	1300	2" MPT	3" MPT

(mm)

	D1	D2	E1	E2
2 Row*	55	55	138	138
4 Row	116	88	198	226
6 Row, 8 Row	88	88	226	226

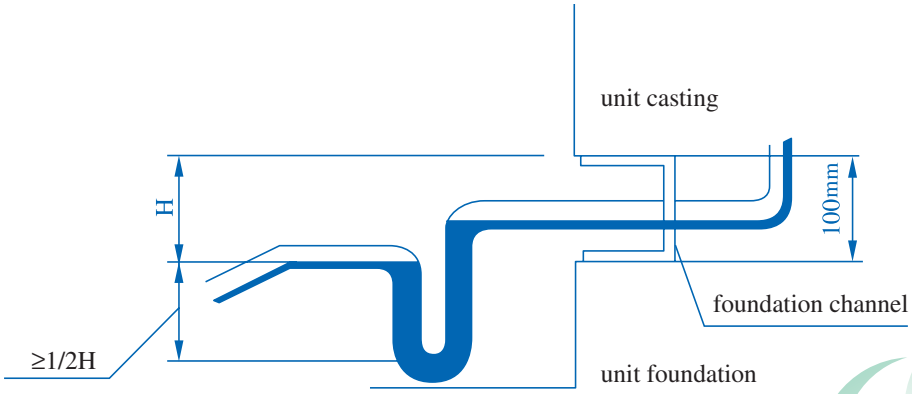
* 2 row coil with 1/2" MPT connection for hot water heating.

Note: MPT=External pipe thread

Foundation Plinth Requirement

The foundation requirements of the units:

- The foundation is designed according to the units' length and weight.
- Unit foundation should be higher than floor in order to install condensate trap see figure below:



Note: H=the maximal negative pressure (mm)+50mm

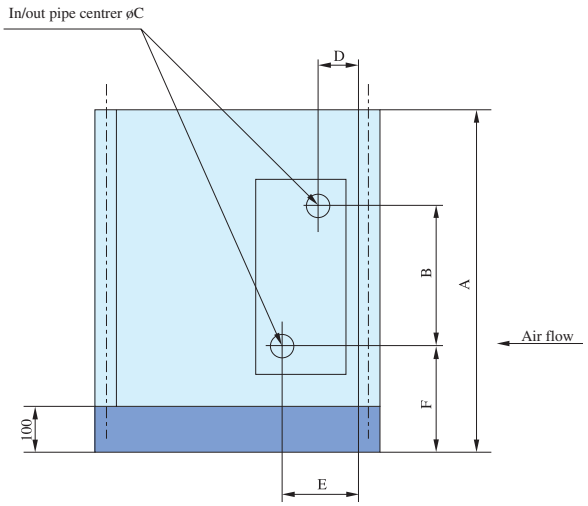
Steam Coil

Heating Capacity

Unit size	Coil Model	Steam Pressure (MPa)			Net weight kg
		0.02	0.1	0.2	
0609	(GL-2R-09-06) x 1	28.3	32.6	36.2	45
0610	(GL-2R-09-07) x 1	38.2	44.2	49.1	48
0712	(GL-2R-11-09) x 1	53.9	62.3	69.1	57
0813	(GL-2R-15-10) x 1	76.4	88.3	97.9	80
0914	(GL-2R-17-11) x 1	92.1	106.5	118.1	98
1015	(GL-2R-19-12) x 1	115.9	136.7	151.5	107
1016	(GL-2R-19-13) x 1	129.6	149.9	166.2	114
1117	(GL-2R-22-14) x 1	161.1	186.4	206.7	126
1317	(GL-2R-13-14) x 2	188.5	217.9	241.6	167
1518	(GL-2R-15-15) x 2	234.9	271.6	301.3	212
1522	(GL-2R-15-19) x 2	271.4	313.8	348.1	243
1622	(GL-2R-17-19) x 2	298.9	345.7	382.8	269
1822	(GL-2R-19-19) x 2	345.6	399.4	442.7	286
1824	(GL-2R-19-21) x 2	387.4	448.1	496.3	303
1825	(GL-2R-19-22) x 2	416.6	481.7	533.0	320
2025	(GL-2R-22-22) x 2	464.8	537.8	595.5	354
2226	(GL-2R-22-23) x 2	525.6	607.3	672.5	374
2330	(GL-2R-22-27) x 2	620.7	717.4	795.9	413
2334	(GL-2R-22-31) x 2	724.0	835.8	927.9	471

Note: Rate at 7°C on Coil-temperature
Net weight exclude unit section

Steam Coil Dimensions

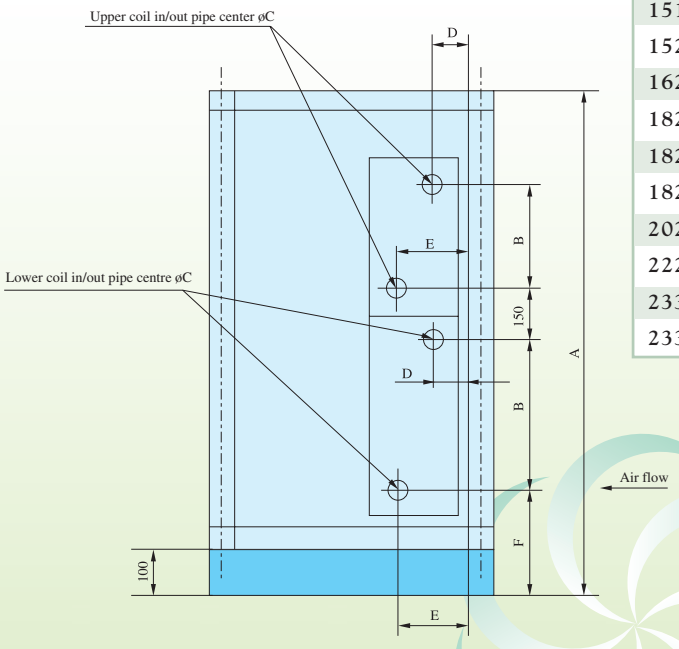


(mm)

Unit size	A	B	øC	F
0609	810	287	2" MPT	278
0610	810	287	2" MPT	278
0712	910	358	2" MPT	278
0813	1010	500	2" MPT	278
0914	1110	571	2" MPT	278
1015	1210	678	2' MPT	278
1016	1210	678	2 " MPT	278
1117	1310	78A	2 " MPT	278

(mm)

	D	E
2 Row	80	154



(mm)

Unit size	A	B	øC	F
1317	1510	429	2" MPT	278
1518	1710	500	2" MPT	278
1522	1710	500	2" MPT	278
1622	1810	571	2" MPT	278
1822	2010	678	2" MPT	278
1824	2010	678	2" MPT	278
1825	2010	678	2" MPT	278
2025	2210	784	2" MPT	278
2226	2410	784	2" MPT	478
2330	2510	784	2" MPT	478
2334	2510	784	9" MPT	478

(mm)

	D	E
2 Row	80	154

Fan

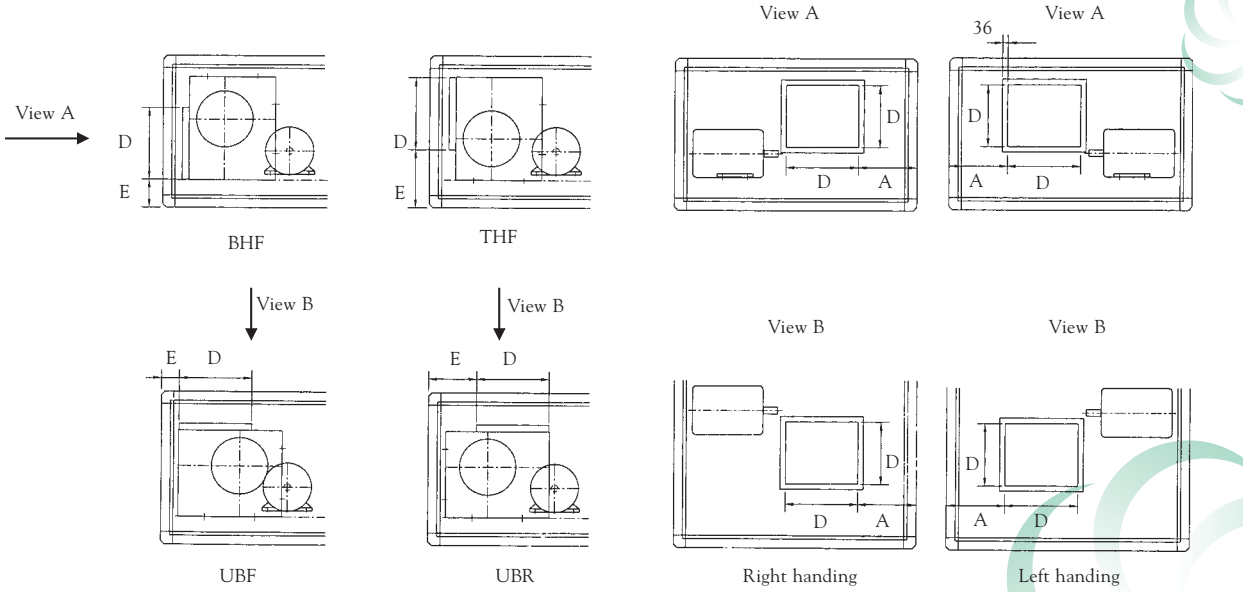
Unit Size	Standard fan size	Maximum motor rating (kW)	Maximum motor frame number	Fan section Total length (mm)	Net weight (kg)
0609	ADZ180	1.5	Y90	710	20.55
0610	ADZ180	2.2	Yl00	810	20.55
	ADZ200				23.21
0712	ADZ/RDZ225	3.7	Y112	910	32.98
	ADZ/RDZ250				34.98/37.08
0813	ADZ/RDZ280	5.5	Y132	1010	41.44/43.64
	ADZ/RDZ315				46.44/47.64
0914	ADZ/RDZ315	5.5	Yl32	1010	46.44/47.64
	ADZ/RDZ355				60.41/64.41
1015	ADZ/RDZ355	7.5	Y132	1010	60.41/64.41
	ADZ/RDZ400				73.48/76.48
1016	ADZ/RDZ355	7.5	Y132	1010	64.21/68.21
	ADZ/RDZ400				77.21/80.21
1117	ADZ/RDZ400	11	Yl60	1210	79.02/82.02
	ADZ/RDZ450				88.02/97.52
1317	ADZ/RDZ400	15	Y160	1210	79.02/82.02
	ADZ/RDZ450				88.02/97.52
1518	ADZ/RDZ450	15	Y160	1210	88.02/97.52
	ADZ/RDZ500				97.16/108.16
1522	ADZ/RDZ500	18.5	Yl80	1610	97.16/108.16
	ADZ/RDZ560				186.0/195.0
1622	ADZ/RDZ560	18.5	Yl80	1710	186.0/195.0
	ADZ/RDZ630				250.0/253.0
1822	ADZ/RDZ560	18.5	Y180	1710	186.0/195.0
	ADZ/RDZ630				250.0/253.0
1824	ADZ/RDZ560	22	Yl80	1710	186.0/195.0
	ADZ/RDZ630				250.0/253.0
1825	ADZ/RDZ630	30	Y200	1910	250.0/253.0
	ADZ/RDZ710				281.0/323.0
2025	ADZ/RDZ630	30	Y200	1910	250.0/253.0
	ADZ/RDZ710				281.0/323.0
2226	ADZ/RDZ710	30	Y200	2010	281.0/323.0
	ADZ/RDZ800				370.0/405.0
2330	ADZ/RDZ800	37	Y225	2210	370.0/405.0
	ADZ/RDZ900				442.0/490.0
2334	ADZ/RDZ800	45	Y225	2210	370.0/405.0
	ADZ/RDZ900				442.0/490.0

Note: Net weight of fan & motor assembly, excludes unit section

Fan Performance

UNIT SIZE	AIR VOLUME at 2.5 m/s (L/S)	Total Fan Static - 700 Pa Forward Curved				Total Fan Static - 900 Pa Backward Curved			
		Size	RPM	Sound dBA	Motor (kW)	Size	RPM	Sound dBA	Motor (kW)
0609	614	FC180	2374	75.8	1.5	FC180	2698	78.5	1.5
0610	849	FC200	2113	76	1.5	FC200	2386	78	2.2
0712	1227	FC225	1939	76	2.2	FC225	2174	81.3	3
	1227	FC250	1654	80	2.2	FC250	1908	78.8	3
0813	1746	FC280	1462	77.9	3	FC280	1687	80.3	4
	1746	FC315	1375	75.7	3	FC315	1598	79.3	4
	1746	BC280	3146	85.6	4	BC280	3352	86.7	4
	1746	BC315	2494	79.5	3	BC315	2670	80.8	3
0914	2029	FC315	1355	76.1	3	FC315	1558	79.1	4
	2029	FC355	1178	74.5	4	FC355	1347	77.1	5.5
	2029	BC315	2675	82	3	BC315	2857	83.1	4
	2029	BC355	2147	79.3	3	BC355	2330	80.8	4
1015	2619	FC355	1165	76.9	4	FC355	1324	78.8	5.5
	2619	FC400	1056	73.8	4	FC400	1209	76.9	5.5
	2619	BC355	2380	83.2	4	BC355	2551	84.4	5.5
	2619	BC400	1954	79.8	4	BC400	2124	81.4	5.5
1016	2879	FC355	1165	78	5.5	FC355	1321	79.8	5.5
	2879	FC400	1046	74.2	4	FC400	1199	77	5.5
	2879	BC355	2496	84.9	5.5	BC355	2671	86.1	5.5
	2879	BC400	2031	81.3	5.5	BC400	2192	82.7	5.5
1117	3587	FC400	1033	76	5.5	FC400	1169	77.9	7.5
	3587	FC450	900	74	5.5	FC450	1031	76.7	7.5
	3587	BC400	2230	84.9	7.5	BC400	2397	86.1	7.5
	3587	BC450	1738	80.4	5.5	BC450	1874.6	81.7	7.5
1317	4200	FC400	1034	78.2	7.5	FC400	1164.0	79.6	7.5
	4200	FC450	893	75.3	5.5	FC450	1020.0	77.6	7.5
	4200	BC400K	2422	87.8	7.5	BC400K	2578.0	88.8	7.5
	4200	BC450	1864	83.1	7.5	BC450	2006.0	84.3	7.5
1518	5191	FC450	902	78.2	7.5	FC450	1015	79.6	11
	5191	FC500	831	77.2	7.5	FC500	943	79.3	11
	5191	BC450	2090	87.2	11	BC450K	2212	88	11
	5191	BC500	1653	84.7	11	BC500	1783	85.9	11
1522	5899	FC500	833	78.8	11	FC500	942	80.5	11
	5899	FC560	723	77	7.5	FC560	831	79.7	11
	5899	BC500	1754	86.9	11	BC500K	1887	88.1	15
	5899	BC560	1414	82.6	11	BC560	1532	84.1	11
1622	6371	FC560	724	77.7	11	FC560	825	80	11
	6371	FC630	655	76.7	11	FC630	750	79.3	15
	6371	BC560	1453	83.7	11	BC560	1572	85.2	11
	6371	BC630	1200	80.6	11	BC630	1312	82	11
1822	7315	FC560	724	79.3	11	FC560	821	81.1	15
	7315	FC630	646	77.7	11	FC630	743	80.1	15
	7315	BC560	1522	85.8	15	BC560K	1653	87.2	15
	7315	BC630	1270	83	11	BC630	1368	84.1	15
1824	8259	FC560	731	81.2	15	FC560	820	82.5	15
	8259	FC630	643	79.1	15	FC630	732	81	18.5
	8259	BC560K	1723	89	18.5				
	8259	BC630	1345	85.4	15	BC630K	1437	86.2	18.5
1825	8967	FC630	638	80.1	15	FC630	731	81.9	18.5
	8967	FC710	608	79.6	15	FC710	700	82.4	18.5
	8967	BC630K	1402	87	18.5	BC630K	1497	87.8	18.5
	8967	BC710	1100	82.4	15	BC710	1185	83.6	15
2025	9911	FC630	642	81.7	15	FC630	728	83.1	22
	9911	FC710	604	80.4	15	FC710	689	82.7	22
	9911	BC630K	1485	89.2	18.5	BC630K	1572	89.8	22
	9911	BC710	1148	84.2	15	BC710	1235	85.3	18.5
2226	11563	FC710	600	82	18.5	FC710	681	83.9	22
	11563	FC800	529	80.5	18.5	FC800	603	82.9	30
	11563	BC710	1244	87.3	22	BC710	1326	88.1	22
	11563	BC800	1008	83.9	18.5	BC800	1082	85.3	22
2330	13686	FC800	525	82.4	22.0	FC800	597	84.2	30
	13686	FC900	473	80.5	22.0	FC900	543	83.3	30
	13686	BC800	1093	86.7	22.0	BC800K	1163	87.8	30
	13686	BC900	863	84.2	18.5	BC900	936	85.7	22
2334	16046	FC800	529	84.8	30				
	16046	FC900	467	81.6	30	FC900	537	84	30
	16046	BC800K	1194	89.8	30				
	16046	BC900	926	87	30	BC900	995	88.1	30

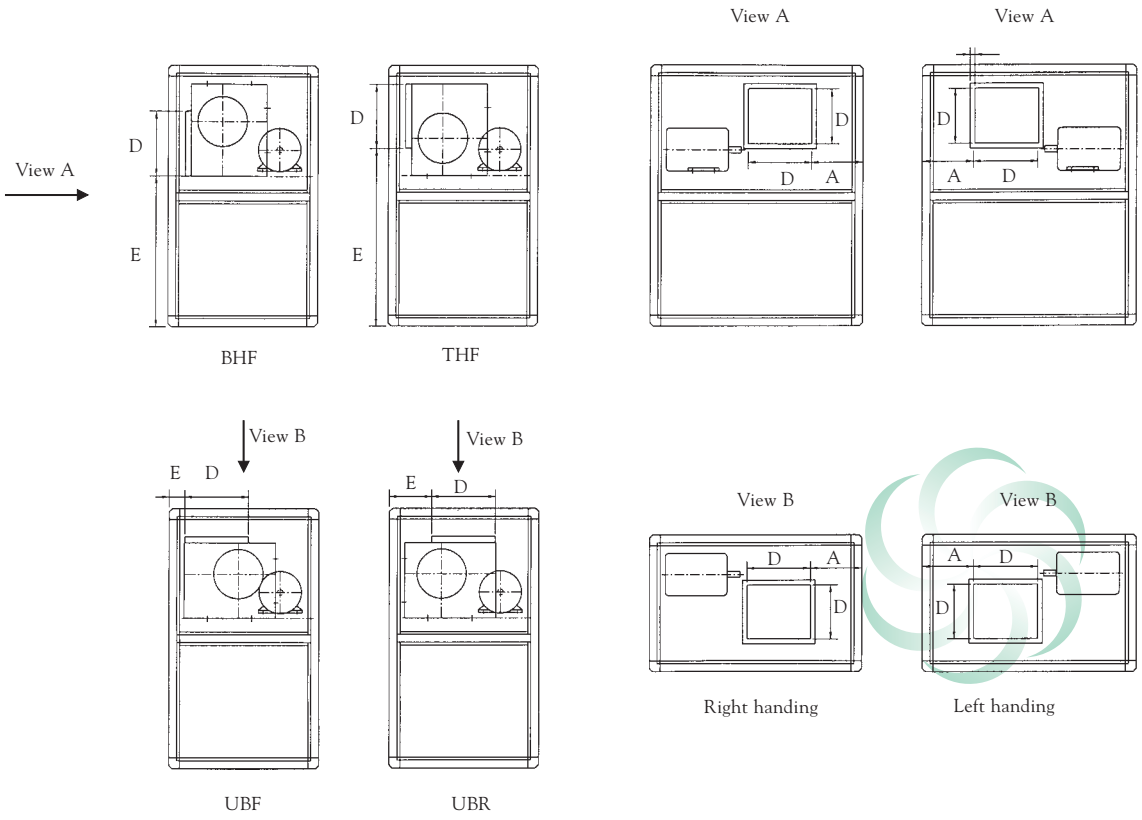
Horizontal Unit Discharge Configuration and Dimension



(mm)

Unit Size	Fan Model	A	D	E			
				THF	BHF	UBF	UBR
0609	ADZI80	294.5	229	290.5	193.5	130	227
0610	ADZI80	344.5	229	290.5	193.5	130	227
	ADZ200	317.5	256	298.5	192.5	130	236
0712	ADZ/RDZ225	416.5	288	312.5	192.5	130	273
	ADZ/RDZ250	416.5	322	324	192	130	262
0813	ADZ/RDZ280	397.5	361	340.5	193.5	130	311
	ADZ/RDZ315	354.5	404	359.5	191.5	130	298
0914	ADZ/RDZ315	404.5	404	359.5	191.5	130	298
	ADZ/RDZ355	396.5	453	384.5	194.5	130	320
1015	ADZ/RDZ355	446.5	453	384.5	194.5	130	320
	ADZ/RDZ400	396.5	507	413	193	130	350
1016	ADZ/RDZ355	496.5	453	384.5	194.5	130	320
	ADZ/RDZ400	496.5	507	413	193	130	350
1117	ADZ/RDZ400	546.5	507	413	193	130	350
	ADZ/RDZ450	429.5	569	441.5	193.5	130	378
1317	ADZ/RDZ400	546.5	507	413	193	130	350
	ADZ/RDZ450	384.5	569	441.5	193.5	130	378
1518	ADZ/RDZ450	434.5	569	441.5	193.5	130	378
	ADZ/RDZ500	415.5	638	463.5	193.5	130	400
1522	ADZ/RDZ500	615.5	638	463.5	193.5	130	400
	ADZ/RDZ560	622.5	715	509.5	208.5	130	431
1622	ADZ/RDZ560	622.5	715	509.5	208.5	130	431
	ADZ/RDZ630	536.5	801	551.5	207.5	130	474
1822	ADZ/RDZ560	622.5	715	509.5	208.5	130	431
	ADZ/RDZ630	536.5	801	551.5	207.5	130	474
1824	ADZ/RDZ560	722.5	715	509.5	208.5	130	431
	ADZ/RDZ630	696.5	801	551.5	207.5	130	474
1825	ADZ/RDZ630	746.5	801	551.5	207.5	130	474
	ADZ/RDZ710	634.5	898	599.5	208.5	130	521
2025	ADZ/RDZ630	746.5	801	551.5	207.5	130	474
	ADZ/RDZ710	634.5	898	599.5	208.5	130	521
2226	ADZ/ROZ710	684.5	898	599.5	208.5	130	521
	ADZ/RDZ800	625	1007	655.5	208.5	130	577
2330	ADZ/RDZ800	825	1007	655.5	208.5	130	577
	ADZ/RDZ900	797	1130	712.5	208.5	130	634
2334	ADZ/RDZ800	1025	1007	655.5	208.5	130	577
	ADZ/RDZ900	1172	1130	712.5	208.5	130	634

Vertical Unit Discharge Configuration and Dimension



(mm)

Unit Size	Fan Model	A	D	E			
				THF	BHF	UBF	UBR
0609	ADZ180	294.5	229	1000.5	903.5	130	227
0610	ADZ180	344.5	229	1000.5	903.5	130	227
	ADZ200	317.5	256	1008.5	902.5	130	236
0712	ADZ/RDZ225	416.5	288	1122.5	1002.5	130	273
	ADZ/RDZ250	416.5	322	1134	1002	130	262
0813	ADZ/RDZ280	397.5	361	1250.5	1103.5	130	311
	ADZ/RDZ315	354.5	404	1269.5	1101.5	130	298
0914	ADZ/RDZ315	404.5	404	1369.5	1201.5	130	298
	ADZ/RDZ355	396.5	453	1394.5	1204.5	130	320
1015	ADZ/RDZ355	446.5	453	1494.5	1304.5	130	320
	ADZtRDZ400	396.5	507	1523	1303	130	350
1016	ADZ/RDZ355	496.5	453	1494.5	1304.5	130	320
	ADZ/RDZ400	496.5	507	1523	1303	130	350
1117	ADZ/RDZ400	546.5	507	1623	1403	130	350
	ADZ/RDZ450	429.5	569	1651.5	1403.5	130	378
1317	ADZ/RDZ400	546.5	507	1823	1603	130	350
	ADZ/RDZ450	384.5	569	1851.5	1603.5	130	378
1518	ADZIRDZ450	434.5	569	2051.5	1803.5	130	378
	ADZ/RDZ500	415.5	638	2073.5	1803.5	130	400

Electric Heater

Electric Heater Selection

Unit Size	Maximum capital (W)	Face Area (m^2)	1 Row Heater		2 Row Heater		3 Row Heater	
			Capacity (kW)	Net Weight (kg)	Capacity (kW)	Net Weight (kg)	Capacity (kW)	Net Weight (kg)
0609	810	0.26	<5	17.0	5-10	21.0	10-14	25.0
0610	960	0.30	<6	18.0	6-12	22.0	12-18	26.0
0712	1260	0.48	<8	27.5	8-16	32.5	16-22	37.5
0813	1410	0.63	<13	30.5	13-26	39.5	26-38	48.5
0914	1560	0.80	<14.5	35.0	14.5-29	44.5	29-43	54.0
1015	1710	1.00	<20.5	42.0	20.5-41	55.5	41-60	69.0
1016	1860	1.08	<22.5	43.7	22.5-45	58.2	45-65	72.7
1117	2010	1.31	<24	47.6	24-48	63.2	48-70	78,6
1317	2010	1.58	<30	56.5	30-60	76.0	60-85	95.5
1518	2360	2.00	<36	63.0	36-72	84.0	72-105	105.0
1522	2960	2.53	<44	70.0	44-88	96.0	88-130	122.0
1622	2960	2.72	<46	74.0	46-92	100.0	92-135	126.0
1822	2960	3.10	<53	73.0	53-106	114.0	106-155	145.0
1824	3260	3.42	<59	95.5	59-118	130.5	118-175	165.5
1825	3410	3.59	<61	97.2	61-122	133.2	122-180	169.2
2025	3410	4.02	<72	107.0	72-144	149.0	144-210	191.0
2226	3560	4.66	<85	121.5	85-170	171.5	170-250	221.5
2330	4160	5.74	<100	137.0	100-200	196.0	200-280	255.0
2334	5360	6.61	<125	148.5	125-250	216.5	250-340	284,5

Note: 1. Star Connection in stages of 30 kw or less
2. minimum air flow velocity of 2.0m/s
3. 3M module section holds maximum of 3 row heater
4. Capacity exceeding 3 rows should choose two separate heaters in 6M module section
5. 380V 3Ph 50Hz electrical supply

Unit Section Weight

Unit Size	Section Length (M)				Front/End Panel (kg)
	3M	6M	9M	12M	
0609	69.7	95.7	121.5	146.2	10.4
0610	74.0	100.9	128.0	154.9	11.6
0712	86.7	118.1	148.3	178.3	16.3
0813	97.6	130.7	165.9	199.2	20.3
0914	103.4	140.8	177.9	213.1	24.3
1015	108.6	149.9	190.0	229.1	29.4
1016	113.4	155.7	196.7	236.6	31.3
1117	120.2	165.2	209.7	251.0	36.7
1317	125.5	173.0	220.1	263.8	43.5
1518	135.1	186.3	237.3	284.6	53.2
1522	176.3	254.2	290.5	344.3	65.1
1622	178.9	238.2	295.6	350.6	69.5
1822	182.9	244.7	304.6	362.1	78.2
1824	196.5	260.6	325.7	387.9	85.4
1825	202.0	267.3	333.6	396.8	89.0
2025	207.2	275.1	343.8	409.4	98.9
2226	217.8	289.5	361.9	431.0	113.3
2330	242.2	319.9	398.2	472.3	136.8
2334	263.1	345.3	428.7	507.4	155.1

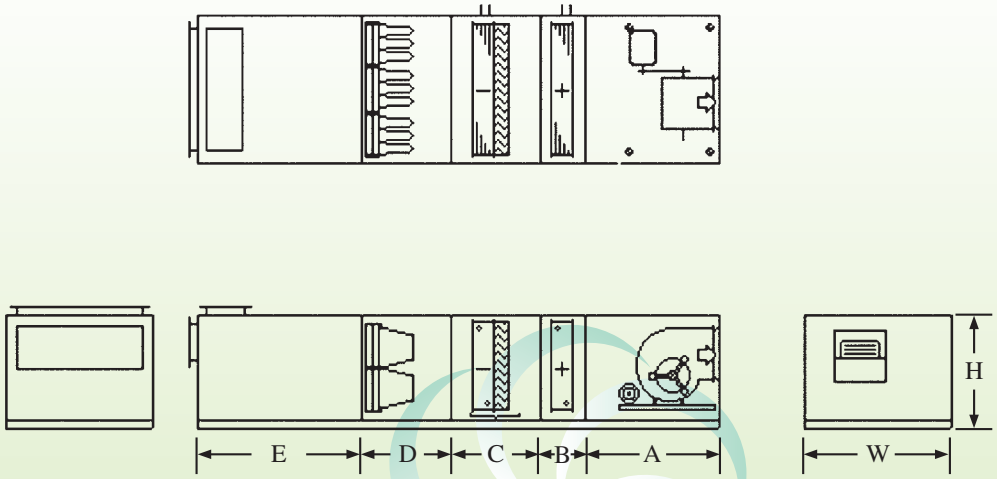
Note: Section weight includes base channel

39CBF Units Dimension

Model No.	Width and Height		Section Length				
39CBF	H	W	A	A+C	A+C+D	A+C+D+E	A+C+D+E+B
0609	810	1010	710	1310	1910	2410	2710
0610	810	1110	810	1410	2010	2510	2810
0712	910	1310	910	1510	2110	2610	2910
0813	1010	1410	1010	1610	2210	3310	3610
0914	1110	1510	1010	1610	2210	3310	3610
1015	1210	1610	1010	1610	2210	3310	3610
1016	1210	1710	1010	1610	2210	3310	3610
1117	1310	1810	1210	1810	2410	3510	3920
1317	1510	1810	1210	1810	2410	3510	3920
1518	1710	1910	1210	1810	2410	3620	3920
1522	1710	2310	1610	2210	2920	4020	4430
1622	1810	2310	1710	2420	3020	4230	4530
1822	2010	2310	1710	2420	3020	4230	4530
1824	2010	2510	1710	2420	3020	4230	4530
1825	2010	2610	1910	2620	3220	4430	4620
2025	2210	2610	1910	2620	3220	4430	4730
2226	2410	2710	2010	2720	3320	4530	4830
2330	2510	3110	2210	2920	3520	4730	5030
2334	2510	3510	2210	2920	3520	4730	5030

Section Code

H	Unit Height
W	Unit Width
A	Fan
B	Hot Water Coil
C	Chilled Water Coil
D	Bag Filter or Combined Panel & Bag Filter
E	Mixing Chamber



39CBF Central Station Air-Handling Units

HVAC Guide Specifications
Size Range: 500 to 16,000 Nominal L/s
Carrier Model Number: 39CBF

Part 1 - General

1.01 QUALITY ASSURANCE

A. Manufacturer Qualifications:

Company specializing in manufacturing the Products specified in this section with minimum of five years documented experience.

B. Units shall be manufactured in a facility registered to ISO 9001 and ISO 9002 manufacturing quality standard.

C. Coil Performance and all software selections shall be certified in accordance with ARI Standard 410 or by EUROVENT certification program.

D. Unit model and its country of origin shall be EUROVENT listed and certified.

E. All material used inside air-stream shall meet HKFSD requirements and shall comply with BS476 Part 6 and Part 7.

1.02 START-UP REQUIREMENTS

Do not operate units until ductwork is clean, filters are in place, bearings lubricated, condensate properly trapped, piping connections verified and leak tested, belts aligned and tensioned, all shipping braces have been removed, and fan has been test run under observation.

Part 2 - Products

2.01 GENERAL DESCRIPTION

A. The unit including fan, coil, filter and mixing box shall be wholly manufacture by the same manufacturer. The unit may be shipped in divided sections, but shall be cut down to the minimum. Each section shall be wholly completed at manufacturer's work place, and only connection of sections may be done at site. Oversized units cannot be fitted in normal container shipment or cannot be delivered through access at site may be considered shipment in complete knock down form, but reassembling works must be done by engineers of the manufacturer.

B. Unit shall be factory-supplied, central station air handler. The air-handling unit shall consist of factory-installed components as indicated on the equipment schedule and drawings.

2.02 CASING

A. Construction:

1. Unit shall be constructed of a complete frame with easily removable panels. Removal of any panel shall not affect the structural integrity of the unit. All bolts and fastenings used to mount panel onto the frame shall be hidden from sight and must not protrude from surface, creating a smooth easy cleaning surfaces on both inside and outside of the unit. All casing corners shall be radiused or chamfered.
2. Panels and frames shall be thermally broken so as not to allow a clear thermal conduction path from the inside of the casing to the outside.
3. All unit sections shall be supplied with minimum 3mm galvanized steel structural base-rails supporting the whole unit base. Bolt-on legs are NOT acceptable. Perimeter lifting lugs on the base-rail for overhead rigging shall be provided on each section.

4. Casing panels (top, sides, and bottom) and unit frames shall be constructed of galvanized steel, with pre-painted, baked enamel finish on both inside surface and outside surface for the whole unit. Casing panels shall be solid doublewall construction with insulation sealed between the inner and outer panels. Panel insulation shall be polyurethane with maximum thermal conductivity of 0.02W/mK.
5. Casing deflection shall not exceed 4mm/m under maximum fan pressure as depicted by EUROVENT prEN1886 Class 2A on Mechanical Strength.
6. Side panels shall be easily removable for easy access to unit by cam-lock type fasteners. All panels shall seal against a full perimeter gasket to ensure a tight seal. A single continuous piece air cushioned gasket shall be used to seal perimeter of all access door. Air sealing performance shall meet 0.44L/sm^2 at 400Pa negative pressure as depicted by EUROVENT prEN1886 Class B on Air Leakage rate of casing.
7. The fan section shall have hinged doublewall access door on hand side with key lock and separate holding handles. Double glazed viewport shall be included together with marine light inside and light switch outside.

2.03 FAN

A. General:

1. Fan scroll, wheel, shaft, bearings, drives, and motor shall be mounted on a common base assembly. The base assembly may be isolated from the outer casing with factory-installed spring type isolators and canvas duct connection between fan discharge and cabinet. The whole fan assembly including the fan-scroll, supporting frames, motor mount, shall all be pre-painted and protected from corrosion.
2. Fan supports, structural members, panels, or flooring shall not be welded, unless aluminum, stainless steel, or other corrosion-resistant material is used. Painted welds on unit exterior steel are not acceptable.
3. Forward-curved fans shall have one double-width double-inlet (DWDI) fan wheel and scroll. They shall be constructed of galvanized steel with baked enamel finish on scroll.
4. Backward-inclined fans shall have one double-width double-inlet (DWDI) fan wheel and scroll. Fan blades shall be flat blade design constructed of heavy gage, high strength steel continuously welded to the back plate and the spun inlet flange. Entire fan assembly, including the fan wheel, scroll, supporting members shall be painted with enamel.
5. Fans performance and selection software shall be tested and verified by EUROVENT or recognized testing laboratory. Completed fan assembly shall be dynamically balanced at factory.
6. Fan wheels shall be keyed to the shaft and shall be designed for continuous operation at maximum rated fan speed and motor horsepower. Fan wheels and shafts shall be selected with a maximum operating speed 15% below the first critical.

B. Bearings:

Self-aligning, grease lubricated, anti-friction with lubrication fittings extended to drive side of fan section. Fan bearings shall be heavy-duty pillow block type, self-aligning, regreasable ball or roller type bearings selected for a minimum average life of 100,000 hours.

C. V-Belt Drive:

Drive shall be designed for a minimum 1.5 service factor. Drives shall be fix pitch, factory set for specified speed. All drives shall be factory mounted, with sheaves aligned and belts properly tensioned.

D. Fan shafts shall be solid steel, turned, ground, polished and coated with a rust inhibitor.

E. Fan motor:

1. Fan motor shall be mounted within the fan section casing on slide rails equipped with adjusting screws. Motor shall be totally enclosed fan cooled with protection rated to IP55 Class B. All three-phase motors shall have a ± 10% voltage utilization range and a 1.15 minimum service factor.
2. Motor shall be mounted on a horizontal flat plate and shall not be supported by the fan or its structural members.
3. The mounting plate shall be capable of adjustment in two axis, i.e. longitudinally for drive belt tension and laterally for pulley alignment.

2.04 COILS

A. All coils shall be provided to meet the scheduled performance. All coil performance and selection data shall be certified in accordance with ARI Standard 410 or by EUROVENT. All water coils shall be tested at 28 bar air pressure. Coil face air velocity shall not exceed 2.5m/s and galvanized steel drift eliminator shall be installed for face velocity exceeding 2.4m/s.

B. General Fabrication:

   1. All water coils shall have minimum 12mm OD copper tubes mechanically expanded into fins to ensure high thermal performance with lower total flow and pumping requirements. Minimum tube wall thickness shall be 0.4mm.
   2. Aluminum plate fin shall be minimum 0.127mm thick with belled collars. Aluminum-finned coils shall be supplied with pre-painted coil casing and tube sheets of mill galvanized steel as specified.
   3. Headers shall be constructed of steel with steel MPT connections. Headers shall have drain and vent connections accessible from the exterior of the unit.
   4. Configuration: Coils shall be drainable, with non-trapping circuits. Coils will be suitable for a design working pressure of 20bar at 95°C water temperature.

C. Drain Pans:

   1. Drain pans shall be insulated stainless steel construction. An external sheet metal forming a double-wall to the drain pan shall be used to protect the insulation from damage. The pan shall have draining exit at bottom of pan and shall allow no standing water.
   2. Drain connection shall be insulated from the drain pan to the point at which it exits the casing. One drain outlet shall be supplied for each cooling coil section.
   3. Where two or more coils are stacked in a coil bank, insulated intermediate drain pans shall be provided and the condensate shall be piped to the bottom drain pan. The bottom coil shall not serve as a drain path for the upper coil.

2.05 FILTER SECTIONS

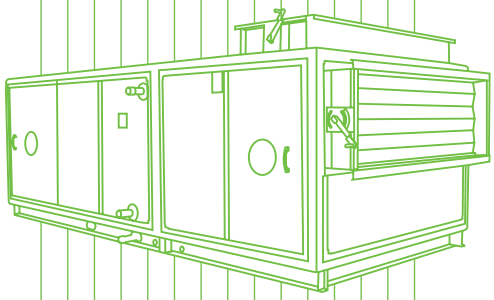
A. Flat filter sections shall accept either 25mm or 50mm filters. Sections shall include clip-on type front withdrawal filter holding frame, and access door.

B. Draw-thru bag/cartridge filter sections shall be capable of accepting headered standard size 150mm to 300mm deep rigid media or bag filters.

2.06 DAMPERS

A. Mixing boxes shall have parallel or opposed blades and interconnecting outside-air and return-air dampers.

   1. Damper blades shall be factory mounted in galvanized steel frame. Damper blades shall be constructed of galvanized steel, with high temperature blade and edge seals. Blades shall be mechanically fastened to axle rods rotating in self-lubricating bearings. To eliminate blade warping, dampers shall be sectionalized to limit blade length to 1500mm maximum. Fresh air damper blades shall be arranged with linkage to work in conjunction with Return air damper such that when one opens to 75% the other would closes to 25%.



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