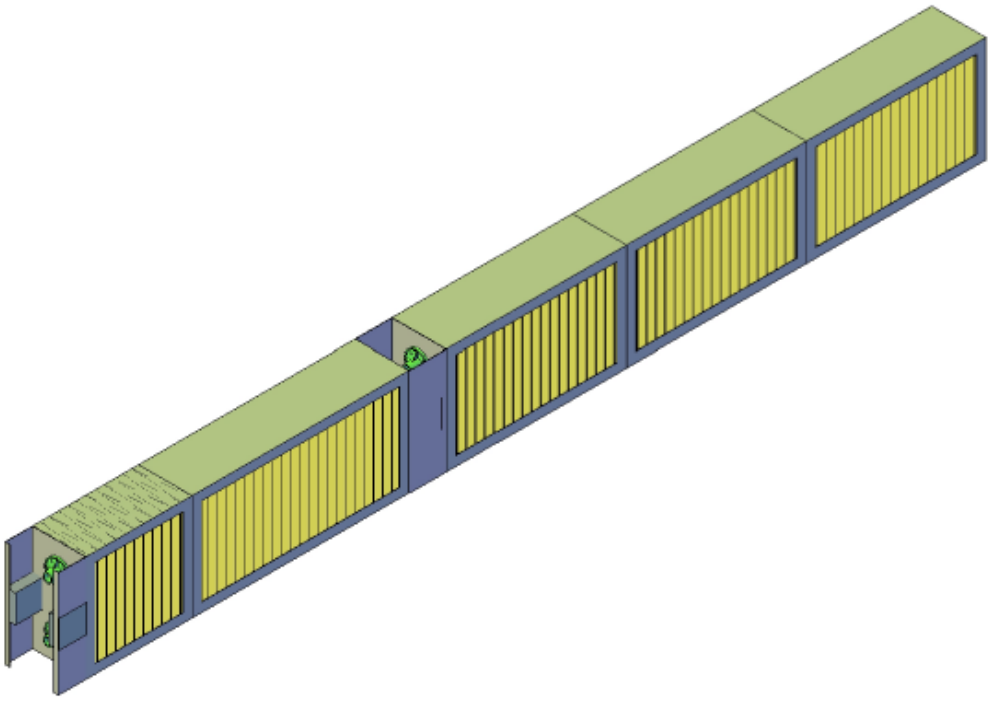
GENESIS AIR

CREATING CLEAN AIR TO BREATHE



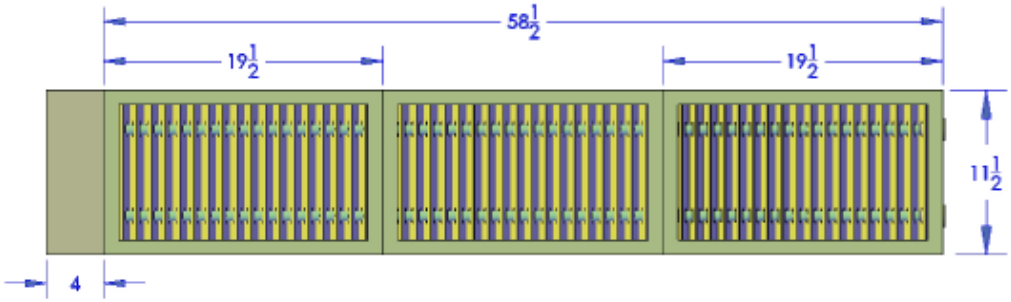
2008 PCP Compound Applications Guide

INTRODUCTION

The Compound Populated Catalyst Panel (PCP Compound) is a combination of PCP Standard and Drop-In technologies. It may be used in conjunction with panels from either genre. This type of panel may be used in all air handlers with only one side access. It is used to reduce the levels of Volatile Organic Compounds (VOC's) and viable airborne biological contaminants in airstreams, such as Air Handling Units (AHU's), Roof-Top Units (RTU's) or in the ductwork. The PCP Compound is a "scalable" technology; it may be engineered for any size air stream using combinations of standard sizes, or by designing custom units for the non-standard pathways. All Genesis Air products incorporate 3-step GAP technology: MERV Filtration, UVGI Lamps and Photocatalysis.

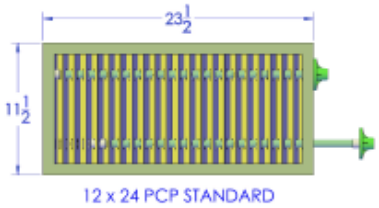
DIMENSIONAL DATA

A PCP Compound is comprised of PCP Standards connected together with the PCP Drop-In ballast tray. For example, the drawing below shows three 12"x 20"x 6" PCP Standards clipped together and attached to the spacer/ballast tray. The designation for this style unit requires three numbers. The first is the height, either 12", 20" or 24". The second number is the total length (nominal) of all PCP Standards built into the unit. The third number, located after the slash, is the outside dimension of the ballast tray length in decimal form. This dimension may vary from unit to unit. The unit below would be a PCP Compound 1260/4. The lamps (this example uses 59" lamps) are then inserted thru the holes and attached to the ballast tray. Where the panels meet, the lamps are protected from the sharp metal edges with plastic bushings.



As the PCP Compound is comprised of PCP Standards, the standard size components for the PCP Compound are found in the chart below. The first dimension is the measurement of the panel across the lamps; the second measurement is along the lamps (see table).

PCP Standard Sizes, inches			
12x12	12x16	12x20	12x24
16x12	16x16	16x20	16x24
20x12	20x16	20x20	20x24
24x12	24x16	24x20	24x24



All dimensions of the PCP Standards are nominal; actual dimensions are ½" less than nominal. The first dimension of the PCP Compound is nominal; the length is the actual length that must be filled by the Compound. All PCP Compound units are 6" deep nominal; actual dimension is 5

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13/16". The catalyst is pleated at one pleat per inch. The lamps are spaced 6" from each other on all models, then centered over the width of the panel. The ballast tray is incorporated into the unit to house the ballasts internally and to fill the leftover overall length. The table below contains all dimensional data for each of the PCP Compounds.

Unit Designation, PCP Compound	Nominal Height, inches	Nominal Width(s), inches	Nominal Compound Width, inches	Actual Compound Height, inches	Actual Compound Width, inches	# of lamps	Length of Lamps, inches
1212	12	12	12	11.5	15.0625	2	12
1612	16	12	12	15.5	15.0625	3	12
2012	20	12	12	19.5	15.0625	3	12
2412	24	12	12	23.5	15.0625	4	12
1216	12	16	16	11.5	19.0625	2	16
1616	16	16	16	15.5	19.0625	3	16
2016	20	16	16	19.5	19.0625	3	16
2416	24	16	16	23.5	19.0625	4	16
1220	12	20	20	11.5	23.0625	2	20
1620	16	20	20	15.5	23.0625	3	20
2020	20	20	20	19.5	23.0625	3	20
2420	24	20	20	23.5	23.0625	4	20
1224	12	24	24	11.5	27.0625	2	24
1624	16	24	24	15.5	27.0625	3	24
2024	20	24	24	19.5	27.0625	3	24
2424	24	24	24	23.5	27.0625	4	24
1228	12	16 + 12	28	11.5	30.75	2	28
1628	16	16 + 12	28	15.5	30.75	3	28
2028	20	16 + 12	28	19.5	30.75	3	28
2428	24	16 + 12	28	23.5	30.75	4	28
1232	12	20 + 12	32	11.5	34.75	2	31
1632	16	20 + 12	32	15.5	34.75	3	31
2032	20	20 + 12	32	19.5	34.75	3	31
2432	24	20 + 12	32	23.5	34.75	4	31
1236	12	24 + 12	36	11.5	38.75	2	36
1636	16	24 + 12	36	15.5	38.75	3	36
2036	20	24 + 12	36	19.5	38.75	3	36
2436	24	24 + 12	36	23.5	38.75	4	36
1240	12	20 + 20	40	11.5	42.75	2	40
1640	16	20 + 20	40	15.5	42.75	3	40
2040	20	20 + 20	40	19.5	42.75	3	40
2440	24	20 + 20	40	23.5	42.75	4	40
1244	12	24 + 20	44	11.5	46.75	2	44
1644	16	24 + 20	44	15.5	46.75	3	44
2044	20	24 + 20	44	19.5	46.75	3	44
2444	24	24 + 20	44	23.5	46.75	4	44
1248	12	24 + 24	48	11.5	50.75	2	48
1648	16	24 + 24	48	15.5	50.75	3	48
2048	20	24 + 24	48	19.5	50.75	3	48
2448	24	24 + 24	48	23.5	50.75	4	48
1252	12	20 + 20 + 12	52	11.5	54.4375	2	51.5
1652	16	20 + 20 + 12	52	15.5	54.4375	3	51.5
2052	20	20 + 20 + 12	52	19.5	54.4375	3	51.5
2452	24	20 + 20 + 12	52	23.5	54.4375	4	51.5
1256	12	20 + 20 + 16	56	11.5	58.4375	2	55
1656	16	20 + 20 + 16	56	15.5	58.4375	3	55
2056	20	20 + 20 + 16	56	19.5	58.4375	3	55
2456	24	20 + 20 + 16	56	23.5	58.4375	4	55
1260	12	20 + 20 + 20	60	11.5	62.4375	2	59
1660	16	20 + 20 + 20	60	15.5	62.4375	3	59
2060	20	20 + 20 + 20	60	19.5	62.4375	3	59
2460	24	20 + 20 + 20	60	23.5	62.4375	4	59

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All PCP Compounds are rated at 500 fpm. As residence time is the most critical factor in designing a viable solution, do not exceed 500 fpm. The maximum CFM allowed per unit based on the FPM are given in the table below. This table was generated for the PCP Standards.

Nominal Size			Actual Size			Frame Opening Size			Nominal Area, ft^2	Frame Opening Area, ft^2	Maximum Recommended Airspeed, FPM	Maximum Recommended Nominal CFM	Maximum Recommended Adjusted CFM
12	x	12	11.5	x	11.5	10.5	x	10.5	1	0.77	500	500	382.81
12	x	16	11.5	x	15.5	10.5	x	14.5	1.33	1.06	500	666.67	528.65
12	x	20	11.5	x	19.5	10.5	x	18.5	1.67	1.35	500	833.33	674.48
12	x	24	11.5	x	23.5	10.5	x	22.5	2	1.64	500	1000	820.31
16	x	12	15.5		11.5	14.5	x	10.5	1.33	1.06	500	666.67	528.65
16	x	16	15.5		15.5	14.5	x	14.5	1.78	1.46	500	888.89	730.03
16	x	20	15.5		19.5	14.5	x	18.5	2.22	1.86	500	1111.11	931.42
16	x	24	15.5		23.5	14.5	x	22.5	2.67	2.27	500	1333.33	1132.81
20	x	12	19.5	x	11.5	18.5	x	10.5	1.67	1.35	500	833.33	674.48
20	x	16	19.5	x	15.5	18.5	x	14.5	2.22	1.86	500	1111.11	931.42
20	x	20	19.5	x	19.5	18.5	x	18.5	2.78	2.38	500	1388.89	1188.37
20	x	24	19.5	x	23.5	18.5	x	22.5	3.33	2.89	500	1666.67	1445.31
24	x	12	23.5	x	11.5	22.5	x	10.5	2	1.64	500	1000	820.31
24	x	16	23.5	x	15.5	22.5	x	14.5	2.67	2.27	500	1333.33	1132.81
24	x	20	23.5	x	19.5	22.5	x	18.5	3.33	2.89	500	1666.67	1445.31
24	x	24	23.5	x	23.5	22.5	x	22.5	4	3.52	500	2000	1757.81

HOW TO SIZE PCP COMPOUND UNITS

PCP Standards are generally preferred over Drop-Ins from a lamp and ballast maintenance standpoint, as there is generally 2 times the amount of lamps in a Drop-In. Drop-In units are a better choice over Standards once the length of lamp required exceeded 60" with only one access door available. Now that the Compound units are available, the Drop-In units should only be used in stand-alone units (such as the 2008B), small AHU's and in conjunction with the Compound unit.

The Compound unit will fill "blocks" of space in an air handler. For instance, the length of a PCP Compound with three 20"x 20"x 6" PCP Standards clipped together and attached to a 3" minimum spacer/ballast tray is 61.5". The ballast tray may be made longer to fill in small gaps, but must not impede the airflow design.

Example: Consider an AHU with a cross-section of 50" by 95" and one side access. Using PCP Drop-Ins, (6) 24x24 and (2) 20x24 units are necessary to fill the void, requiring (30) lamps and ballasts and a spacer of 3.5". By using PCP Compounds, (2) PCP Compound 2460/3 and (2) PCP Compound 2428/3 could be used, reducing lamp and ballast count to (8) 59" lamps, (8) 27" lamps and (16) ballasts. The remainder of the AHU length, 2.5625", will be evenly distributed in the two spaces, making the spacer length 4.28125".

Use the Genesis Air PCP Compound Configuration (included on disc, or located on webpage) to determine size and number of panels in an AHU, RTU or ductwork. Input the required data and print out the configuration.

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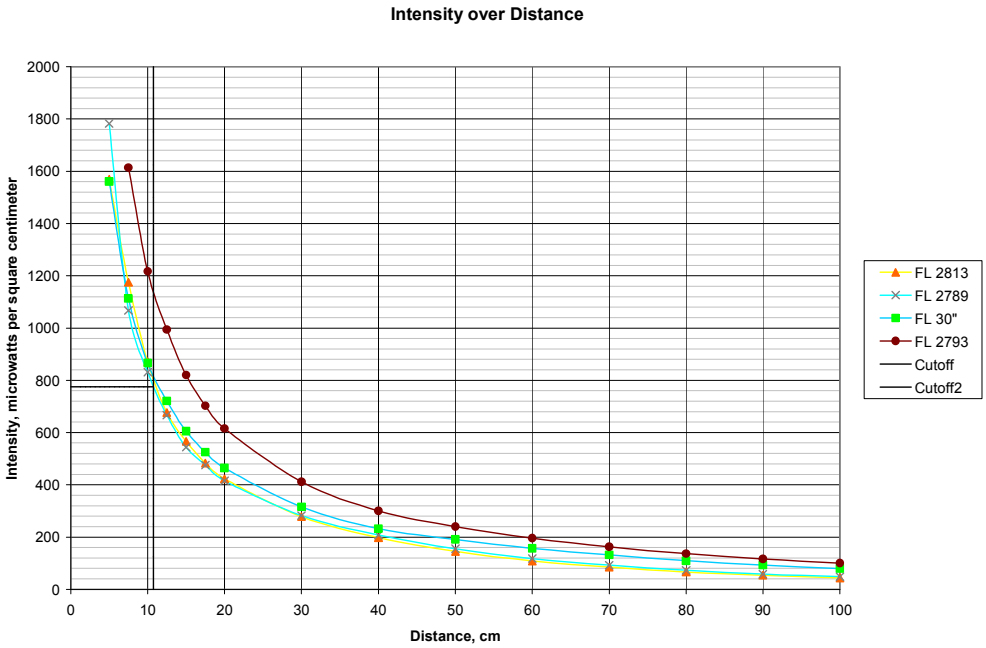
LAMPS

Genesis Air lamps do not produce ozone! The lamps provide a minimum intensity of 775 microwatts/cm^2 (5 milliwatts per square inch) at 10.77 centimeters (4.24") to activate the catalyst effectively. To maintain tested performance, lamps may not be substituted with another manufacturer's products. These lamps provide UV-C wavelengths @ 254 nm. All lamps must be replaced yearly (9000 hrs) to maintain intensity requirements. Genesis Air lamps contain trace amounts of mercury, encapsulated within the lamp and sealed with a Teflon coating, therefore reducing risk to the consumer or ecosphere.



POWER

Ballasts are matched to the specific length of lamp. To maintain tested performance, ballasts may not be substituted with another manufacturer's products. The ballasts must be specified either 120v or 240v, 60 Hz.: contact the factory for other voltage/frequency requirements. The ballast operating temperature range is -20°F to 158°F. Power is delivered from Compound to Compound by a metal conduit running through the catalyst panels.

SAFETY

Genesis Air includes a safety kill switch on all units. This safety turns off the lamps when the pressure drops below 0.4 inches H_2O. The safety also includes a door switch that will turn off lamps when the door is opened.

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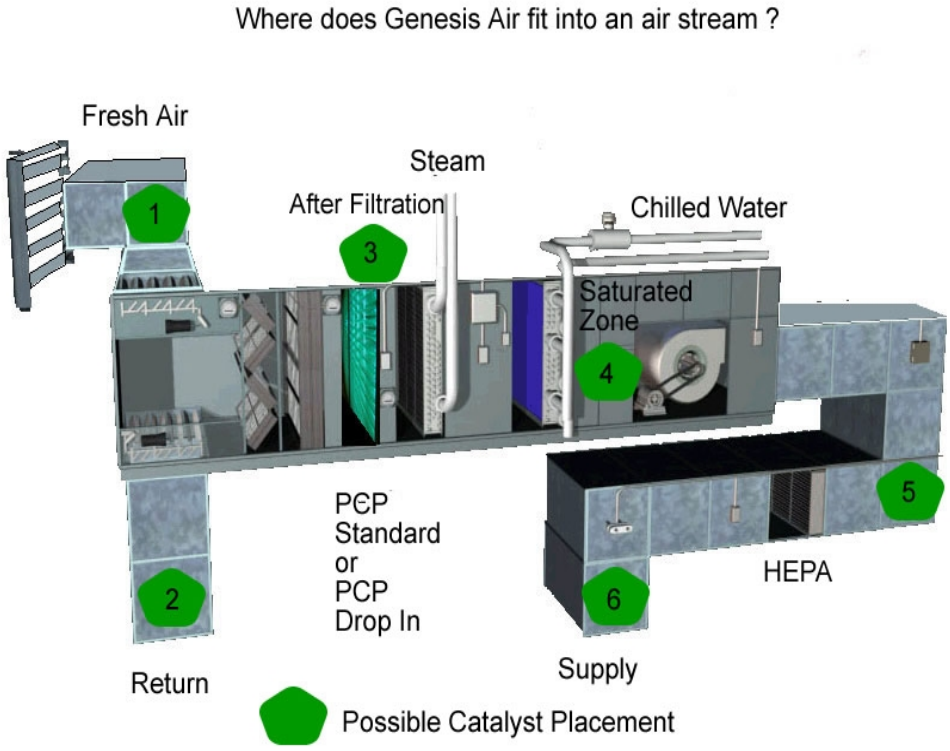
WHERE TO PLACE PCP COMPOUND UNITS



Objective	Location	Solution
Reduce contaminants before entering the AHU	1	• Example – fresh air intake located near heliport • Recommended for general IAQ to reduce TVOC and viable biologics entering unit • Ideal for Genesis Air PCP Standard or Drop-in, or 2008LB • Note: metal pre-filter required
Reduce contaminants leaving particular areas or offices from mixing into air stream	2	• Example – Funeral home body prep; coroner's office; branch on common return with contamination problems (must have filter grille upstream) • Ideal for Genesis Air PCP Standard or Drop-in, 2008LB or 2008DT

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Reduce contaminants entering unit in mixed air stream after filter bank **(recommended)**	3	• Reduces viable biologics and particulate load • Ideal for Genesis Air PCP Standard or Drop-in • Renders captured contaminants non-viable • This placement is preferred when typical RH is 15% or more
Reduce risk of viable biohazards entering supply duct by prohibiting biologics and mold from accumulating on the cooling coil **(recommended)**	4	• Example – Accessory filter section to bathe coils in UV-C light • Ideal for Genesis Air PCP Standard or Drop-in • These units are a cost-effective solution if the end user is requesting UV-C lamps since PCP Standard and Drop-in units will reduce biolevels as well as prohibit buildup on surfaces • This location is preferred when typical upstream RH is below 15%
Lengthen HEPA life by reducing load of contaminant upstream of HEPA	5	• Reduces viable biologics and particulate load • Typical applications include clean rooms and operating suites • Ideal for Genesis Air PCP Standard or Drop-in • Renders captured contaminants non-viable
Reduce contaminants before entering the supply distribution	6	• Ideal for Genesis Air PCP Standard or Drop-in, 2008LB or 2008DT

SPECIFICATION INSERT EXAMPLE AND AIR HANDLING UNIT SCHEDULE

2.7.3 Air Treatment System

System shall be a factory-fabricated and tested three-part integral assembly for treatment of air by: (1) particulate filtration using minimum MERV-13 rating per ASHRAE 52.1; (2) ultraviolet C-band germicidal irradiation (UVGI); and (3) photocatalytic oxidation (PCO). Particulate filters shall be located upstream of and adjacent to the UVGI lamps and PCO filters in the air handling unit's airstream. System shall be manufactured by Genesis Air, Inc., 5202 CR 7350 Ste D, Lubbock, Texas 79424, (806) 745-7000, or equal.

2.7.3.1 Particulate Filters

Units shall be listed according to requirements of UL 900, except high efficiency particulate air filters of 99.97 percent efficiency by the DOP Test method shall be as listed under the Label Service and shall meet the requirements of UL 586. Cartridge type particulate air filters shall be minimum 6 inches in depth, sectional, replaceable dry media type of the size indicated and shall have a MERV of 13 when tested according to ASHRAE 52.2. Initial resistance at 500 fpm shall not exceed 0.56 inches, water gauge. Filters shall be UL class 1. Media shall be pleated microglass paper media with corrugated aluminum separators, sealed inside the filter cell to form a totally rigid filter assembly. Fluctuations in filter face velocity or turbulent airflow will have no effect on filter integrity or performance. Each filter shall be

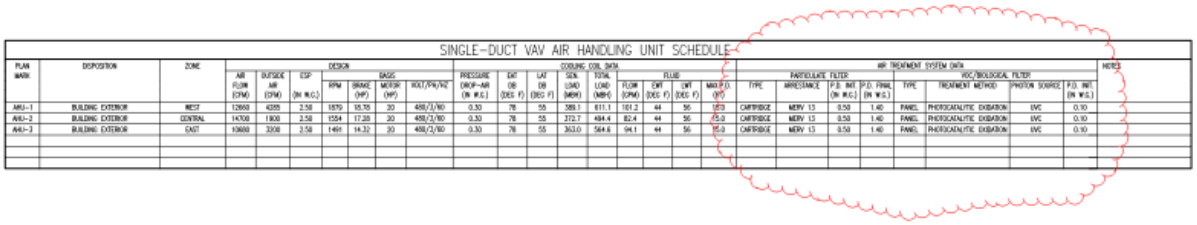
installed with an extended surface pleated media panel filter as a prefilter in a factory preassembled side access housing, or a factory-made sectional frame bank, as indicated.

2.7.3.2 VOC/Biological Filters

VOC/biological filters shall be photocatalytic oxidation (PCO) type using a titanium dioxide (TiO_2) catalyst. PCO filters shall be comprised of pleated media panels in the air stream, with ultraviolet C-band lamps placed through the panels to ensure proper spacing for adequate photon activation. PCO shall be located in an accessory section adjacent downstream from the particulate filter section. Holding frames for 24x24 and 24x12 inch panels shall be provided by the PCO manufacturer. Ballasts for UVC lamps shall be located out of the airstream in recessed framing channels or on the exterior of the air handling unit in NEMA enclosures.

2.7.3.3 Controls

Ultraviolet lamp ballasts shall be monitored by current switch sensors located with the ballasts in the accessory section or associated NEMA enclosure of the air handling unit that provide a signal to the Owner's EMCS. Access doors shall be monitored by pressure sensitive micro-switches that shall de-energize the UV lamps when the door is not fully closed, and shall provide an alarm signal to the Owner's EMCS.



SINGLE-DUCT VAV AIR HANDLING UNIT SCHEDULE

PLAN MARK	DESCRIPTION	ZONE	DESIGN			BASIS				COOLING COIL DATA								AIR TREATMENT SYSTEM DATA								NOTES
			AIR FLOW (CFM)	OUTSIDE AIR (CFM)	ESP (IN W.G.)	RPM	BRAKE (HP)	MOTOR (HP)	VOLT/PH/HZ	PRESSURE DROP-AIR (IN W.G.)	EAT DB (DEG F)	LAT DB (DEG F)	SEN. LOAD (MBH)	TOTAL LOAD (MBH)	FLUID FLOW (GPM)	FLUID ENT (DEG F)	FLUID EXT (DEG F)	MAX P.D. (FT)	PARTICULATE FILTER TYPE	PARTICULATE FILTER ARRESTANCE	PARTICULATE FILTER P.D. INIT (IN W.G.)	PARTICULATE FILTER P.D. FINAL (IN W.G.)	VOC/BIOLOGICAL FILTER TYPE	VOC/BIOLOGICAL FILTER TREATMENT METHOD	VOC/BIOLOGICAL FILTER PHOTON SOURCE	VOC/BIOLOGICAL FILTER P.D. INIT (IN W.G.)	
AHU-1	BUILDING EXTERIOR	WEST	12600	4255	2.50	1570	15.75	20	460/3/60	0.30	78	55	389.1	611.1	101.2	44	56	15.0	CARTRIDGE	MERV 13	0.50	1.40	PANEL	PHOTOCATALYTIC OXIDATION	UVC	0.10	
AHU-2	BUILDING EXTERIOR	CENTRAL	14700	1800	2.50	1554	17.20	20	460/3/60	0.30	78	55	372.7	484.4	82.4	44	56	15.0	CARTRIDGE	MERV 13	0.50	1.40	PANEL	PHOTOCATALYTIC OXIDATION	UVC	0.10	
AHU-3	BUILDING EXTERIOR	EAST	10600	3308	2.50	1491	14.32	20	460/3/60	0.30	78	55	363.0	564.6	94.1	44	56	15.0	CARTRIDGE	MERV 13	0.50	1.40	PANEL	PHOTOCATALYTIC OXIDATION	UVC	0.10	

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GENESIS AIR QUICK REFERENCE

	2008DT-FP	2008DT	2008B	2008LB	2006D&L	2008GS	2008RGS	2008 PCP STANDARD	2008 PCP DROP-IN	2008CU
Small spaces	×	×			×		×	×	×	×
Medium spaces	×	×		×		×	×	×	×	×
Large spaces			×	×		×		×	×	
Fan-powered	×		×		×	×	×			
Multiple panels standard					×	×				
Multiple panels optional			×	×				×	×	
Located in:										
AHU/RTU								×	×	
Returns		×		×				×	×	×
Supplies		×		×				×	×	×
Trunk lines				×				×	×	
Stand-alone units	×		×		×	×	×			

Note: The 2008 Compound may be used in lieu of Standards and/or Drop-in units.

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CONTACT INFORMATION

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