



**INDOOR AIR QUALITY SPECIALISTS**

# Sentinel 1500

## Air Scrubber



**Item # FG0157**

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# Unpacking & Installation Instructions

If there is any visible external damage to the pallet or box, note this on the shippers paperwork prior to accepting the delivery. If the contents of the pallet are visibly damaged, refuse to accept the shipment and advise Air-Care immediately. Remove the outer box and inspect for damage. Report all damage immediately to your carrier. If special set-up instructions are required, they will be taped to the outside of the equipment or in the “Operating” section of this manual. Inspect all of the packing material for small parts before discarding packaging material.

## Check that all parts are present

1. Sentinel 1500 main assembly, with wheels and handles in tact. Open the top door and check for the filters and accessories inside.
2. White 1<sup>st</sup> stage, 1” Disposable pre-filter
3. Second stage ¼” Disposable filter
4. Third stage filter, 18x24x6” Mini-Pleat HEPA filter.

## Safety Precautions

**Always use safe and common sense precautions when working with Air-Care equipment. Do not block walkways with equipment. Remove delicate and breakable articles from the immediate work area. The following are precautions that should be reviewed by all persons who will be involved in the cleaning activity.**

- Other than the 3 filters, there are no user serviceable components in the Air-Care Sentinel Air Scrubber. Only trained technicians should attempt to make internal repairs on this equipment.
- Always turn off the main power switch on the control panel, or disconnect the power before opening or removing the top or removing the filters from the Sentinel.
- Be sure all power cords and electrical extensions are rated to meet or exceed the original Air-Care power cords (12 gauge), and inspect all AC power plug to be sure the Ground Pin is in place.
- Never connect power to Air-Care equipment unless all covers, and safety shields are in place. Mechanical and electrical parts could activate and cause injury.
- Never allow anyone except a properly trained technician to use the equipment or/and cleaning products.
- All Air-Care equipment is designed for US standard 115 volt, 60 Hz AC. Most Air-Care equipment can be special ordered to meet other worldwide standards for a reasonable price and delivery schedule. Always check the specifications on the equipment before connecting electrical power to Air-Care equipment. The Sentinel 1500 can be special quoted for 220 Volt 50 Hz but may have reduce performance or incur additional costs to provide the same performance as the 60 Hz model.

If you have questions about the safe use of any Air-Care product, call 702-454-5515  
Equipment specifications and part numbers are subject to change without notice.

## **Air Scrubbers, When and How to use them**

Briefly, an **Air Scrubber** circulates ambient air through its filter system, usually 3 stages with a HEPA final stage, and exhausts clean air into that environment. It is a BIG air purifier. Sometimes, the air scrubber may also contain activated carbon filters to adsorb odors and chemicals that may be in the ambient air.

A **Negative Air Machine** pulls in ambient air, filters it (just like the air scrubber) and has a means to exhaust it outside of the building, or at least outside of the “Contained” part of the building. Carbon Filters may be employed in the Negative Air Machine, also. The Negative Air machine may be located outside of the contained area with a hose to transport air out of the contained area.

The same type machine often performs these 2 functions, so it may be a little confusing at times. It’s like saying you will “Uncork” a bottle with a “Rubber Stopper”. “Cork” originally defined a “Cork Stopper” before “Rubber Stoppers” were invented, so the nickname “Cork” applies more to the function of the device than the material from which it is made. Air Duct Vacuums (Collectors) can also perform “Air Scrubber” and “Negative Air Machine” functions. I will try to use the correct term in the context of each function, but remember that the terms are somewhat interchangeable. The term refers to the function accomplished with a particular configuration that provides the desired airflow more than it applies to a specific piece of hardware.

When should you consider using one or more of these devices? There are only a few universal regulations or standards, but to say it is all guesswork is not at all true. On a construction site where large amounts of fine dust are generated, it would be expected that the workers would be wearing eye protection as well as some type of respirator to protect their lungs. If the site was adjacent to an office with a full staff, it would be unthinkable to start the work without a temporary barrier of plastic sheeting to prevent the dust from covering the occupants and the office equipment. If the dust was potentially toxic and the particles were too small to be seen by the naked eye, even more protection for both the workers and the adjacent occupants would be required. This is the basic reason, it is necessary to filter the air in the work area, and to put that contaminated area in a “Negative Pressure” condition. areas.

Once the contaminated areas are defined, a remediation plan can be created to contain the contamination. Putting up Plastic walls, building an air lock, sealing off the supply and return ducts, and installing negative air machines is next. Remember that Containment walls and access door control the contaminated air paths, but the room pressurization controls the direction and amount of that flow. Containment design as well as Negative Air Machine and Air Scrubber size and locations must be considered together to match the needs of each project. The scope of this manual will only discuss the Containment structures in very general terms. There are many sources for containment construction in

got General Particulate control as well as the much more stringent Mold and Asbestos protocols.

Pressurization must be maintained at a minimum of .02” of W.G. between the area of Mold Growth and the uncontaminated area. If spores have spread to other areas of the building, that area needs to be cleaned and isolated, but it should NOT be in the same containment area as the primary growth area. Since this secondary area only has spores, and not growth, it will be in a separately contained area. This means you will have 3 ZONES, 1) is Very Contaminated, 2) is Contaminated, and 3) is Clean or Uncontaminated.

To prevent contamination of the other areas, Zone 1 will need to be “Negatively Pressurized” first. The HEPA filtered Air will be exhausted from Zone 1 with a negative air machine with enough capacity to provide a minimum of 4 air changes per hour. The pressure drop should be measured between this room and Zone 2, and also Zone 3. It should be .02” W.G. between 1 and 2 and .02” W.G. between Zone 2 and 3. Measuring from Zone 1 to Zone 3 should find .04” W.G.

The pressure drop should be maintained at .02” W.G. between a contained and an uncontained area. This can be measured with a simple manometer. It is rugged, easy to setup, and inexpensive (around \$50), so if it does get damaged or contaminated, it is not a major loss.

The size and number of machines depends on the volume of the space being contained as well as how “Loose” the containment is. If a containment structure lets a lot of air in the doors and joints, it will require more than the theoretical “minimum”. As a starting point, calculate the square footage of the room or rooms, multiply by the ceiling height, and remember that if this area has a common ceiling plenum, you must attach the containment walls to the ceiling deck above the drop ceiling tile grid. It is generally recommended to have a minimum of 4 air changes per hour in the work area. To convert this requirement to a CFM spec for the Negative Air Machines, multiply the Volume of the work area by 4 changes/Hour then divide by 60 Minutes/Hour.



$$\frac{\text{Length} \times \text{Width} \times \text{Height} \times 4}{60} = \text{cfm}$$

Or simplified,

$$\frac{\text{Length} \times \text{Width} \times \text{Height}}{15} = \text{cfm}$$

So, a room that is 15 feet wide by 40 feet long with an 8-foot ceiling would require a negative air machine with:

$$\frac{15 \times 40 \times 8}{15} = 320 \text{ cfm}$$

If that room had a common ceiling return plenum, making the ceiling deck 11 feet high, then:

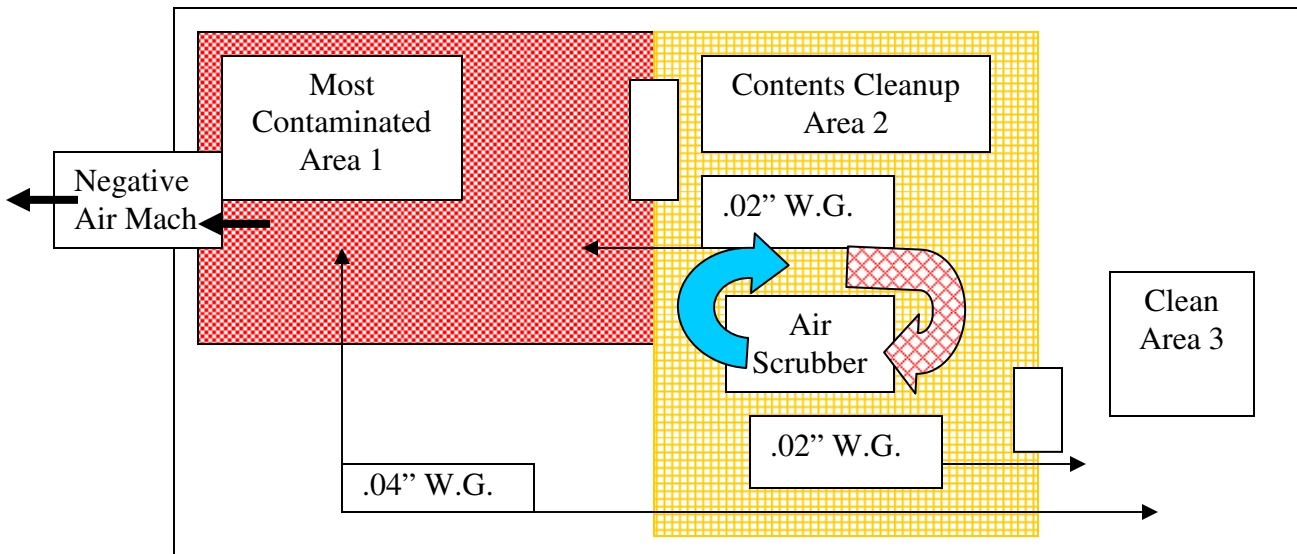
$$\frac{15 \times 40 \times 11}{15} = 440 \text{ cfm}$$

Now here is the tricky part, what if the drop is NOT at the minimum? The air should be flowing from outside into the Clean Zone (3), then from Zone 3 to Zone 2 (slightly Contaminated), and finally into the most contaminated Zone 1. If the containment is not well sealed or the Door flaps between zones pull open with the airflow, you will need to increase the CFM or reduce the airflow into the area. Remember, the recommended air exchange rate is from 4 to 12 air changes per hour.

If this area requires a higher-pressure difference, you may need to go as high as 12 changes per hour, which means you would divide by 5, which gives us 1320 cfm for the same area that required only 440 cfm if it were tighter.

$$\frac{15 \times 40 \times 11}{5} = 1320 \text{ cfm}$$

As the filters become loaded, the effective cfm will drop slightly, so be sure you have a little more capacity than the minimum. By the same token, if you have too much capacity, it is possible to pull down the containment walls, with potentially disastrous results.



To achieve balance on an actual job, it may be necessary to use multiple negative air machines, and it may be necessary to use a negative air machine in Zone 2 to exhaust clean air out outside.

Once the air flow is in the correct direction, and the pressure drop between clean, sort of dirty and really dirty are balanced, it may still be necessary to add an air scrubber inside the work area for either the main remediation Zone due to dust and debris from heavy construction work, or in the Intermediate Zone where the building contents are being cleaned to assure the level of contamination does not become greater than it already is.

An Air Scrubber is often used under a cleaning table fitted with a wire mesh top. The Technicians use HEPA vacuums to clean the objects from the room on top of the screen so that any contaminate that would potentially become airborne will be pulled down into the air scrubber and captured. While it is running, it is filtering the room air, and constantly removing any particles that have become airborne as the contents of the room are being moved from place to place to be cleaned.

It may seem a bit overwhelming at first glance, but the methods developed for containing airborne Asbestos fibers during 35 years of abatement, are well proven and easily adaptable to the current need to protect workers and occupants from airborne mold spores and hyphae.

To review the use of Air Scrubbers and Negative Air machines. They are required when a contaminated area or the contents of an area are contaminated with mold, asbestos, lead or any other potentially dangerous airborne substance. The Negative Air Machine must be matched with the Containment Structure to provide outside air to flow from the cleanest area to the slightly dirty and finally the Most Dirty area where the HEPA filtered Negative Air Machine will pull in Contaminated air, filter it, and discharge it outside the containment area. The difference in pressure between contained areas must be at least .02" W.G. between each, and the airflow must provide between 4 and 12 air changes per hour.

Air Scrubbers may be required to circulate and filter the air within one or more of the contaminated areas to be collect contaminates as they are released into the air, as well as making certain there are not "dead spots" in the contained area where there could be a contaminate buildup.

## Maintenance

### When to Change Filters

It is impossible to predict EXACTLY when filters must be changed

The Pressure gauge on the Panel will provide a guide. For this test, the Inlet must be open, without the Restrictor Plate. When the Air-Care Sentinel is first installed at a new location, turn it on and note the reading on the pressure gauge (usually 3.0 to 3.5). Next block the 12" inlet with a piece of cardboard and again note the meter reading (Usually 4.8 to 5.0).

While operating, the pressure gauge should ALWAYS remain at least 0.6" WC LOWER than the Blocked reading (usually 4.0 to 4.4). Another indication that filters need to be changed is when the pressure gauge reads more than 1" WC HIGHER than the initial reading when the inlet is fully open (Usually 3.0 to 4.5).

The NORMAL pressure reading with the 4" dia. Restrictor Plate installed is 4.4.

When planning the number of pre-filters to have on hand for a job that involves heavy demolition with significant dust and debris in the area, the change cycle could be:

**First Pre-filter:** every 3-4 hours, (2" white)

**Secondary Pre-filter:** every 14 Hours, (1/4" white)

**HEPA** every 800 hours (33 days at 24 hr/day).

**It is also advisable to thoroughly decontaminate the Air scrubber after each job and start each job with a clean set of filters.**

## Determine Project Requirements for Air Scrubbers

<b>Room size vs. Number of Sentinel 1500 required for 4 air changes per Hour</b>			
<b>Room Size (8' to 12' Ceilings)</b>	<b>Cubic feet of Space</b>	<b>CFM Required for 4 Air Changes/ Hr</b>	<b>Required number of Sentinel 1500's</b>
From 20' x 40' to 25' x 50'	6,400 to 15,000	535 to 1250	1 with Restrictor to 1 without restrictor
From 25' x 50' to 50' x 75'	10,000 to 45,000	835 to 3750	1 to 3
From 50' x 75' to 75' x 100'	30,000 to 90,000	2,500 to 7,500	2 to 5

## Specifications

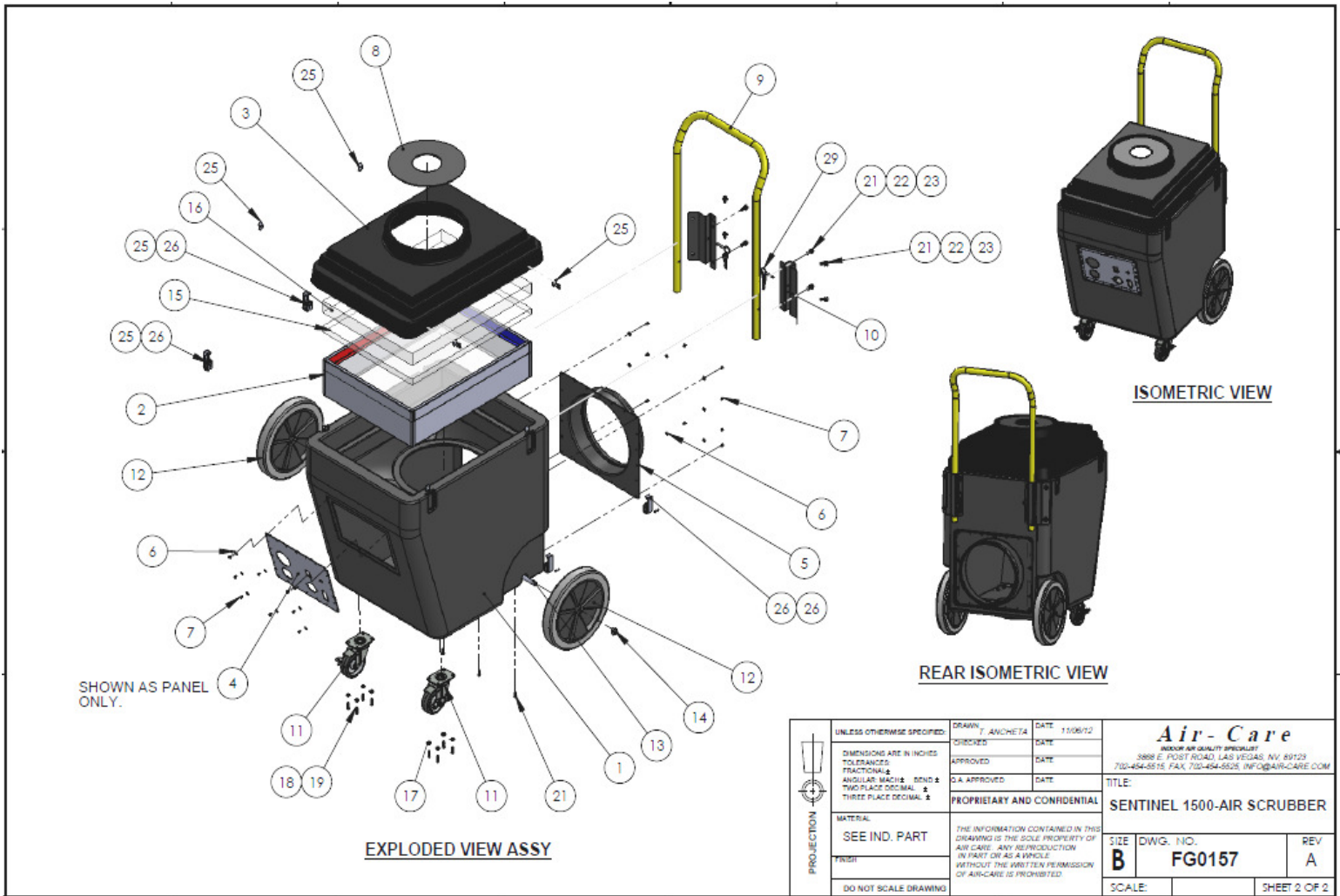
Specification	Description
<b>Size</b>	22" W x 29" D x 38." H (Handle in Down Position)
<b>Weight</b>	105 lbs.
<b>Power required</b>	120 V, 60 Hz, 13 Amps
<b>Power Cord</b>	25' Extension Cord
<b>Filtration</b>	4 stages when optional Carbon Odor adsorbing pad used
<b>Carbon Pre-Filter</b>	Optional Odor and VOC adsorber
<b>1<sup>st</sup> Stage</b>	18" x 24" x 2" Pre-Filter
<b>2<sup>nd</sup> Stage</b>	18" x 24" x 1/4" Pre-Filter
<b>3<sup>rd</sup> Stage</b>	18" x 24" x 6" HEPA Filter
<b>Attachment</b>	12" Dia. Inlet and 12" Dia. Exhaust collar
<b>Operating Environment</b>	25 to 125 Deg. F (-4 to 50 Deg. C)
<b>Construction</b>	Rotation Molded Poly lower body and Vacuum Formed top.
<b>Operating Controls</b>	Single Plug-able Panel with all Gauges, Indicators, Switches, & Meters
<b>Air Flow</b>	1500 CFM with Filters installed, no restrictor plate, or 750 CFM with 4" Dia Restrictor Plate installed
<b>Static Pressure</b>	5.0" W.G.
<b>Motor</b>	1.5 HP, single phase, single speed, 120 volt motor.
<b>Blower</b>	One - Backward Inclined
<b>Wheels</b>	Two - 12" Fixed Rear and Two - 4" Front Swivel Non-Marking Wheels

**\*All specifications and prices are subject to change and improvement without notice.**



## Parts and Accessories

Ref#	Description	Part#
	<b>Sentinel 1500 Air Scrubber, complete with Filters</b>	<b>FG0157</b>
3	Sentinel 1500 Air Scrubber, Top Cover with 12" Inlet Collar	MP0022
16	1st Stage, 18" x 24" x 2" Disposable Pre-Filter pad Pkg of 10	SAO0315
15	2 <sup>nd</sup> Stage, 18" x 24" x 1/4" Disposable Pre-Filter pad. Pkg of 10	SAO0316
2	Third Stage, 18" x 24" x 6" HEPA Filter	F0046
8	Restrictor Plate for reduced Flow	MP0024
Not Shown	Odor Absorbing Carbon Pads (Optional)	COM0162
Not Shown	12" Adapter Plate (Optional)	COM0151
Not Shown	12/3 x25' detachable Extension Power Cord	EC0005
25	Latches to hold upper and lower sections together (4)	COM0032
26	Keeper for Latch (4)	COM0028
9	Tubular Handle	OL0026
12	12" Non-Marking Wheels (2)	ACC0006
11	Front Locking Swivel Casters (2)	COM0096
Not Shown	Bottom Carrying Handle, Spring Loaded	COM0029
Panel	Gauge, 0 to 5" W.C.	COM0033
Panel	Power Receptacle	COM0026
Panel	Light, Panel	EC0055
Panel	Switch, DPST Start	EC0029
Panel	Circuit Breaker/Power Switch, Dual 20 amp.	EC0054
Panel	Hour Meter	COM0345
Not Shown	Motor, 1.5 HP, 3450 RPM single phase	M0002
Not Shown	Inlet Cone	SATJ0035
Not Shown	Blower Wheel, Backward Inclined	COM0133
4	Panel with all Components	SAO0317
Not Shown	12" x 12.5' Light Duty Mylar Hose (Optional)	COM0054
Not Shown	12" x 25' Light Duty Mylar Hose (Optional)	COM0046
5	12" Hose Collar for Exhaust connection (Optional)	MP0023
Not Shown	12" "Lay Flat" exhaust hosing (Optional)	CALL
Not Shown	Operator Manual on Air Care Resource CD	MM0157
10	Handle Bracket (2)	COM0148
29	Pin, Quick Release 1/4" Dia. with Lanyard (2)	COM0353



BILL OF MATERIALS			
ITEM	PART NOS	DESCRIPTION	QTY.
1	CAB0029	CABINET [ LOWER TURBO MAX ]	1
2	F0046	HEPA 18 X 24 X 6	1
3	MP0022	AIR SCRUBBER CABINET TOP	1
4	SAO0319	PANEL PLATE -SILKSCREENED	1
5	MP0023	EXHAUST COLLAR PLATE, 12"	1
6	NBS0053	#10 FLATWASHER	46
7	90190A242	10-32X.50L SELF-TAPPING SCREW	46
8	MP0024	AIR-FLOW RESTRICTOR-SENTINEL 150	1
9	OL0026	HANDLE 1" SS TUBING	1
10	COM0148	HANDLE BRACKET-SENTINEL 1500	2
11	COM0096	4" CASTER, SWIVEL W/ LOCK	2
12	ACC0006	12" WHEELS	2
13	SATJ0016	TURBOMAX-MAXII-AXLE	1
14	COM0095	END CAP	2
15	SAO0316	DISPOSABLE PRE-FILTER PAD -1"	1
16	SAO0315	DISPOSABLE PRE-FILTER PAD -2"	1
17	NBS0058	1*4-20 FLATWASHER .078 THK.	8
18	NBS0057	1-4-20 X 1" HEX HEAD BOLTS	8
19	NBS0066	1/4-20, KEPS NUT	8
20	1032X1	SCREW-10-32 X 1	3
21	516-18	HEX WASHER BOLT-75" LONG	8
22	93852A103	FLAT WASHER	4
23	5-16-18	5/16-18 NUT	4
24	COM0028	KEEPER-DRAW PULL LATCHES	4
25	COM0032	DRAW PULL LATCHES	4
26	RIVET-1/8		8
27	BRACKET	KEEPER-SUPPORT	4
28	6-32 X .50L	SCREW-PAN HD#6-32 X 1/2"L	8
29	COM0353	PIN, QUICK RELEASE W/ LANYARD	2

# Glossary & Acronyms

1. ASHRAE—American Society of Heating, Refrigerating, and Air Conditioning Engineers
2. Air Handler/ AHU—The Furnace or air conditioner that heats, cools and moves the air.
3. Antimicrobial—Agent added to materials to retard growth of biological contaminants.
4. Arrestance – An ASHRAE standard procedure to measure air filter efficiency (52.1)
5. CFM—Cubic Feet per Minute, a measure of how much air is flowing in an air system.
6. Ceiling Plenum – The area above a suspended ceiling that may be used as a return path to the Air Handler.
7. Conditioned Air – The air that has been filtered heated or cooled by the air handler.
8. Dampers – Flaps or valves in the air duct that control the amount of airflow in the duct.
9. Diffusers & Grilles & Registers – The covers at the end of supply and return ducts that control the amount and direction of the air-conditioned air entering or leaving a room.
10. Electrostatic Filter – A High Efficiency (95% Arrestance) Air filter that generate static electricity from the air movement through the air handler and captures dust from the air while the clean air move freely through it.
11. Duct – A metal, plastic or fiberglass tube that transports air to and from the Air Handler. They can be round, square or rectangular.
12. Duct Board – Compressed fiberglass material used to make air ducts, particularly in the southern U.S.
13. Fiberglass Filter – A disposable, very low efficiency filter (approx. 10% arrestance).
14. Flex duct – Plastic fabric duct with a spiral wire support. It is used extensively in the Western U.S.
15. HEPA—High Efficiency Particulate Air, A rating for filters used in critical applications.
16. HVAC—Heating, ventilation and air-conditioning
17. Hybrid – Combining Two types of power sources to perform a single task.
18. Inverter—Electronic device that changes AC current to DC current, increase its voltage and change it 3-Phase AC Power at varying frequency to control motor speed. Also called VFD.
19. MERV- Minimum Efficiency Rated Value, An ASHRAE residential filter rating system (52.2)
20. MSDS—Material Safety Data Sheet
21. Make-up Air – Fresh “outside” air that is brought into a Commercial building.
22. NADCA-- National Air Duct Cleaners Association
23. NAFA – National Air Filter Association
24. NSF International – An independent testing laboratory for Air filters
25. OSHA—Occupational Safety and Health Administration
26. Re-entrainment – The flow of dust and debris removed from an air system back into the same building
27. Return/Return Duct – Duct that Pulls air from the conditioned area to be filtered, heated or cooled.
28. Sanitizer – A material designed to kill mold, bacteria, and viruses.
29. Supply/ Supply Duct—The opening and related ductwork that delivers conditioned air to a room.
30. VAV—Variable air volume system – A system that varies the amount of flow of air to regulate temperature.
31. VFD – Variable Frequency Drive. An electronic speed controller for 3-phase motors.

## Limited Warranty **NEW Document needed**

~~Air Care warrants its products free from defects in materials and workmanship to the original purchaser for a period designated below from the date of purchase. Individual components, such as motors, blowers and electronic devices carry the warranty from the original manufacturer.~~

~~Report any suspected warranty failure of an Air Care product to Air Care immediately for a Return Authorization Code. Upon examination by Air Care, if the product is found defective in workmanship or material, it will be repaired or exchanged, at Air Care's discretion. Failure of components not manufactured by Air Care will be handled on an individual basis.~~

### General Conditions

~~This warranty shall be held void on any Air Care equipment which has been modified or altered in any way or which has been subject to improper maintenance, improper usage or abuse.~~

~~Air Care warrants its equipment to the original purchaser only.~~

~~The Purchaser is responsible for the cost of shipping the equipment to Air Care for evaluation. If found defective, Air Care will pay FedEx ground shipping charges on the repaired or replaced item back to purchaser's location. Any additional expedited service charges shall be born by the purchaser.~~

#### Warranty Periods

~~1 Year Limited Warranty on Duet Leakage Testers~~

~~2 Year Limited Warranty on VIS Models, Truckmaster~~

~~3 Year Limited Warranty on all Turbojet Models, Cobra Models and Air Care DuctMaster Models~~

~~90 days on all other products~~