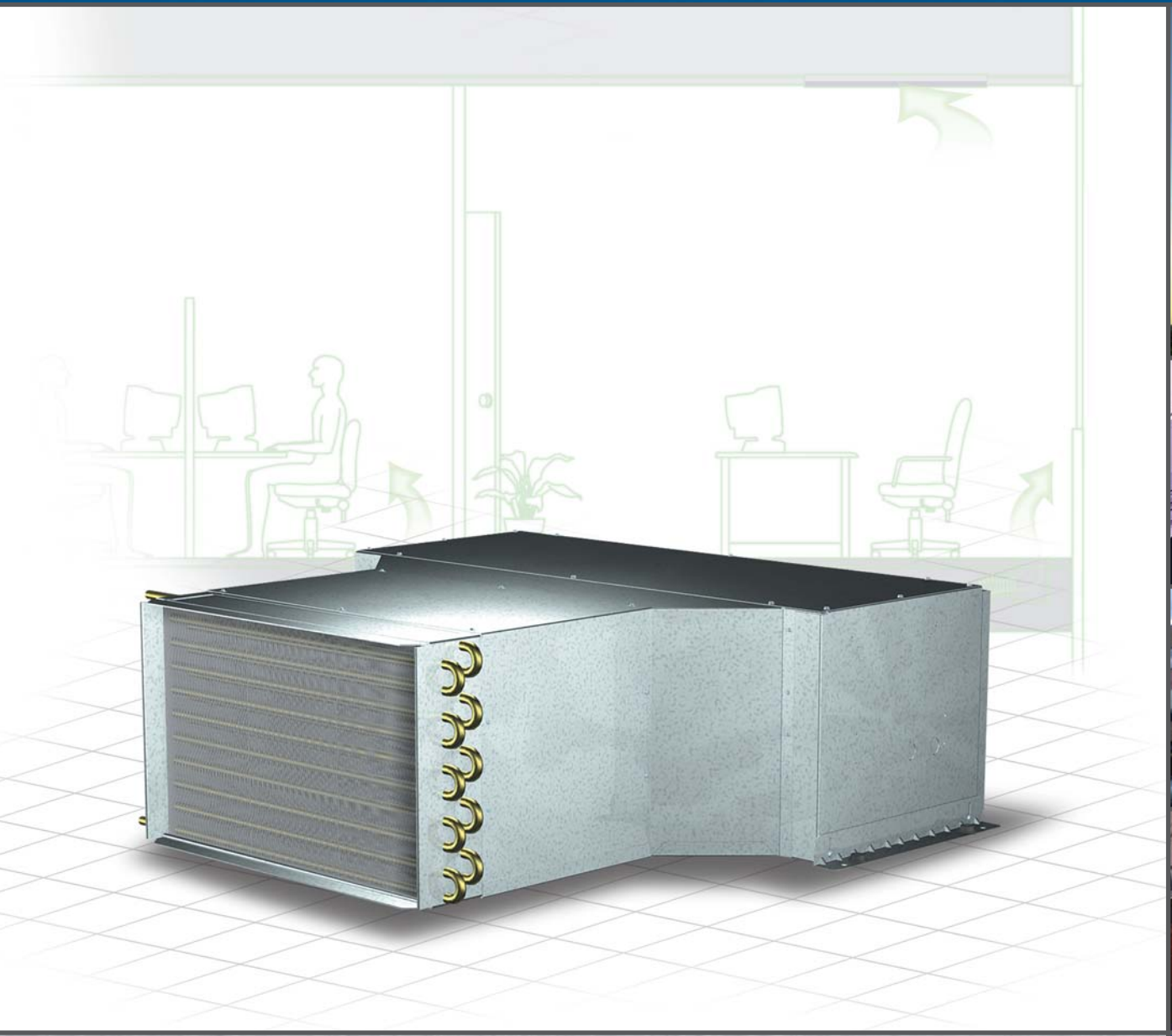
Underfloor Fan Terminal

Model UFT

Energy Efficient Variable Speed with Reheat



GREENHECK

Building Value in Air.

October
2005

MODEL UFT UNDERFLOOR FAN TERMINAL

The Greenheck Model UFT is designed for an underfloor air distribution system to provide cooling or heating to the perimeter zones or interior rooms. Performance ranges from 130 to 1798 cfm with static pressures to 0.875 inches wg.

Incorporating Greenheck's UFT into your underfloor design will give you the benefits of improved space ventilation and air quality, reduced mechanical equipment and operational cost, and enhanced space flexibility.

c UL US LISTED

The UFT Fan is UL Listed for Fan Coil Unit (UL/cUL 1995)

Quick Delivery and Quick Build Programs

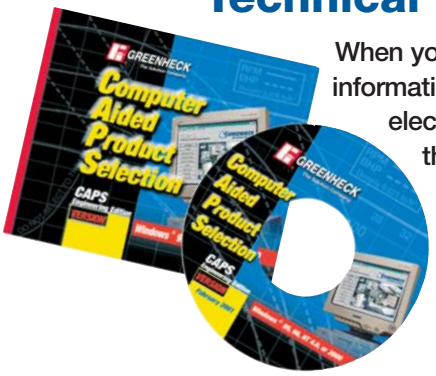
You can order from hundreds of in-stock ventilation products, and accessories that can ship to your job site, in less than 24 hours from our four strategically located warehouses. Speed up your process even more, order your units over the Internet using QD Online at **www.greenheck.com/qd**

For sizes and configurations where rapid response time is required, our Quick Build (QB) Program can manufacture and ship your custom UFT products in ten days with either hot water or no coils.

World Class Manufacturing

Our advanced manufacturing processes, superior engineering, and quality control procedures always ensure the highest product quality. Our skilled production workers use cost-effective machines and unique die designs built by our own engineers to add innovative features and greater strength to our centrifugal exhaust fans. And just to be sure you get the peace-of-mind you expect when you specify Greenheck, our assembly inspectors test run and monitor every fan before it leaves the factory.

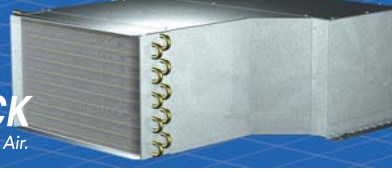
Leading Edge Technical Support



When you need extensive product and IOM (Installation and Operating Manual) information, our products are supported by the industry's best product literature, electronic media, and computer aided selection program (CAPS). You'll also find this information on our website at **www.greenheck.com**

You can always count on personal service and expertise from our national and international representative organization. To locate your nearest Greenheck representative, call 715-359-6171 or visit our website at **www.greenheck.com**

MODULAR RAISED FLOOR SYSTEMS



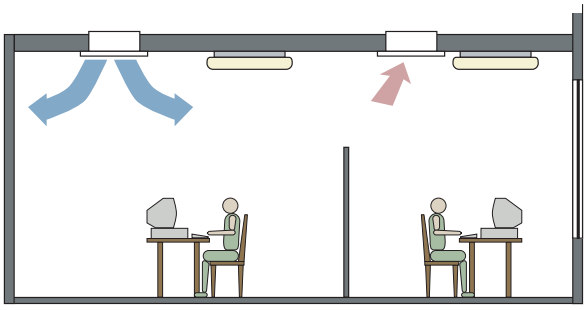
Modular raised floor systems are designed for use in offices, theaters, libraries, museums, trading floors, clean rooms and specialty applications. Raised floor systems are popular due to the demand for flexibility in the distribution of critical services such as power, voice, data and HVAC.

Conventional Building HVAC:

A conventional overhead air distribution system utilizes an extensive duct system to supply and return air from building spaces. A thermostat controls the temperature of the supply air to maintain a set room temperature. The layout of the system is fixed at the time of installation. The pitfalls of a conventional air distribution system are:

- Expensive duct system
- Limited control of thermal preferences
- Reduced flexibility in relocating building occupants
- Substantial cost to modify the ventilation system

Conventional Overhead Air Distribution System

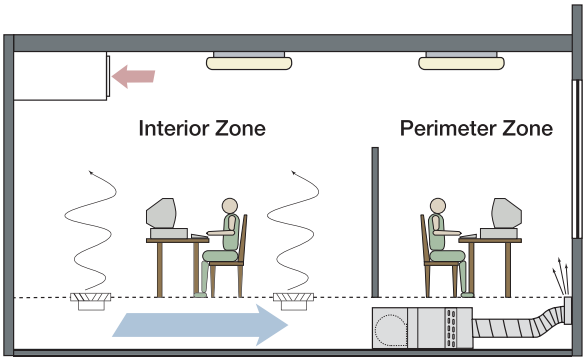


Underfloor Air Distribution:

In air distribution systems designed for underfloor applications, supply air is delivered to building spaces through adjustable spiral diffusers or grilles in the floor. Typical underfloor air applications will designate two zones, interior and perimeter. The temperature in these zones are maintained through differential pressure controllers and/or thermostats. The advantages of underfloor air distribution are:

- Improved Space Ventilation: Adjustable floor diffusers are placed in each persons work area/cubical allowing them to have total control over the amount of air being delivered to their work space. Floor to ceiling airflow results in an improvement in indoor air quality.
- Enhanced Space Flexibility: Diffusers are easily relocatable and adjustable to accommodate occupants' individual preferences, changes in tenants, use of space, and to increases in space loads.
- Reduced Mechanical Equipment Cost: Eliminating most or all of the conventional ductwork results in lower static pressures, up to 1.5 inches less than overhead systems. Less ductwork results in reduced installation costs.
- Reduced Operational Cost: The reduction of static pressure results in lower required fan horsepower.
- Simplified Heat Load Calculations: Each room consists of two zones, a Mixing Zone and a Stratified Zone. The zones are separated at the Stratification Level. Air supplied at the floor level raises and mixes with the heat generated from people and equipment in the workspace. Equipment generating heat above 4 to 6 feet has less impact on the heat load calculations than conventional ventilation systems. All heat loads generated above the Stratification Level can be removed from the load calculations because the air is exhausted at the ceiling.

Underfloor Air Distribution System



Thermal Stratification

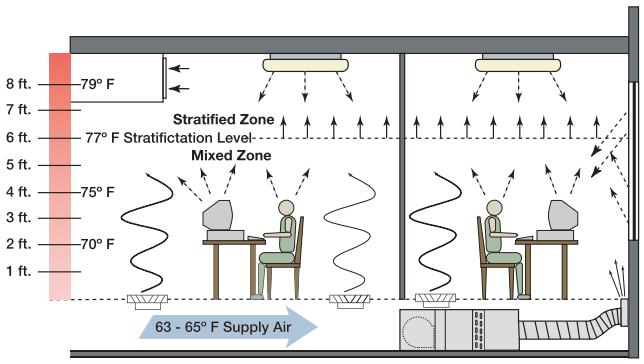


Figure 1 is a diagram of one of many building designs utilizing the raised floor concept.

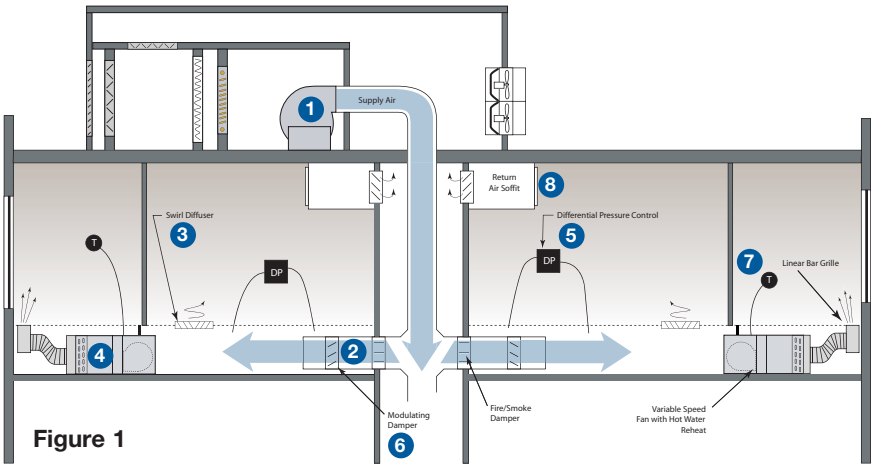


Figure 1

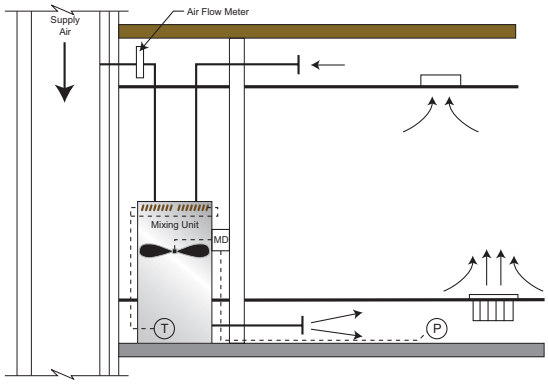


Figure 2

1. Air is supplied by an air handling unit that is placed on the roof. The 63ºF to 65ºF air is supplied through a duct shaft located near the center of the building. Some climates may require the air to be cooled further and then mixed with return air to meet the required temperature of 63º F to 65º F. (Refer to **Figure 2.**)
2. Feeder ducts distribute the air to the underfloor plenum.
3. Adjustable diffusers in the floor tiles distribute the desired amount of air to the interior work zone. By opening or closing the diffuser the occupant can change the temperature in his or her space up to 7ºF.
4. The UFT is used to supply air to the perimeter zones through linear bar grilles. The variable speed design allows the unit to satisfy the heating and cooling loads quickly.
5. A differential pressure sensor is used in conjunction with the building's electronic control system to keep the plenum at the desired constant pressure. Design underfloor are pressure ranges from 0.05 to 0.1 in. static pressure.
6. A modulating damper is used if and when the pressure needs to be adjusted. When a swirl diffuser is adjusted or a UFT fan changes it's operation speed, the differential pressure controller will sense the change in pressure and adjust the damper accordingly.
7. Thermostats are used in conjunction with the building's electronic control system sending a signal to the UFT when a change in temperature is desired.
8. Return air is taken from the work space through soffits or through grilles mounted in place in prehung ceiling tiles. The return air is either mixed with fresh, filtered or tempered air and is supplied back into the building or exhausted by sidewall fans.

Figure 3 is a detailed view of an underfloor HVAC system.

Placement of adjustable diffusers in the interior zone gives occupants control over their environment.

Non-adjustable diffusers are placed in corridors or hallways to maintain a constant temperature.

The UFT supplies air to the perimeter zone of the building through linear bar grilles and quickly satisfies the perimeter heating and cooling loads.

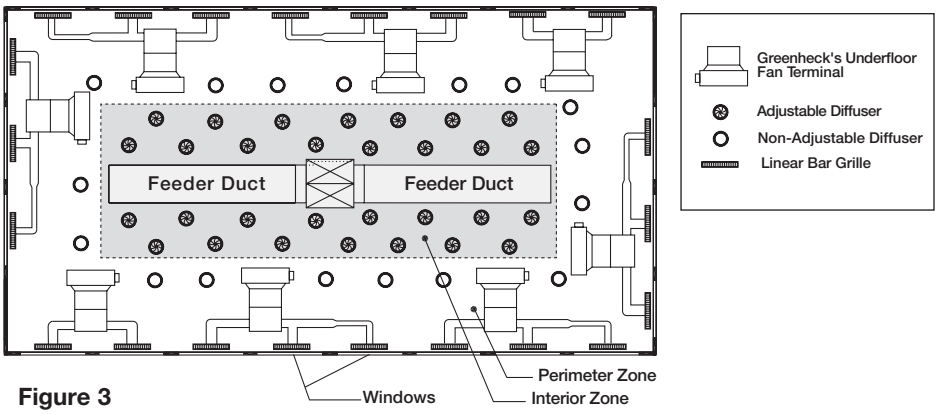
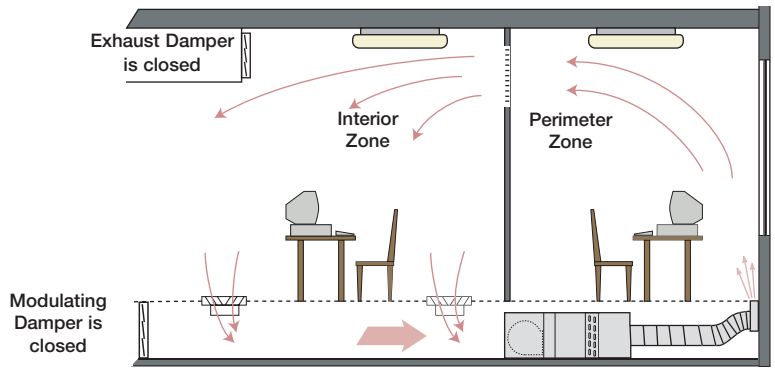


Figure 3

Morning Re-Heat Cycle

Optional hot water or electric coil heating can be used in the early morning during the re-heat cycle, increasing the air temperature to a comfortable level after cooling overnight. During the re-heat cycle, the modulating dampers at the plenum entrance are closed while the UFT heats and circulates the air through the perimeter and interior zones. The system will return to normal daytime operation following the morning re-heat cycle.



Discharge Configurations:

The UFT is typically installed in one of two ways, ducted or non-ducted.

- Ducted System (**Figure 4**): A small duct plenum attached to the outlet of the UFT with flex or spiral duct leading to linear bar grilles which supplies air to the perimeter zone.
- Non-Ducted System (**Figure 5**): The UFT supplies air to a plenum area enclosed by plenum walls built under the raised floor. This plenum divider may be used in the perimeter zone of a building (as shown) or in the interior zone directly under a room where variable air flow is desired.

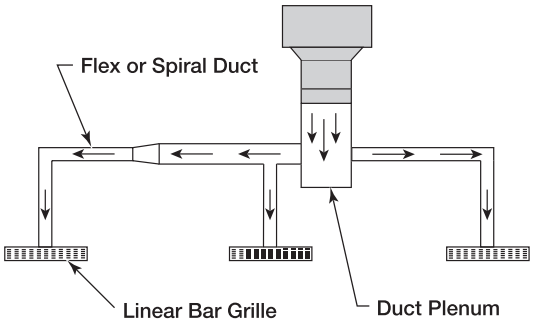
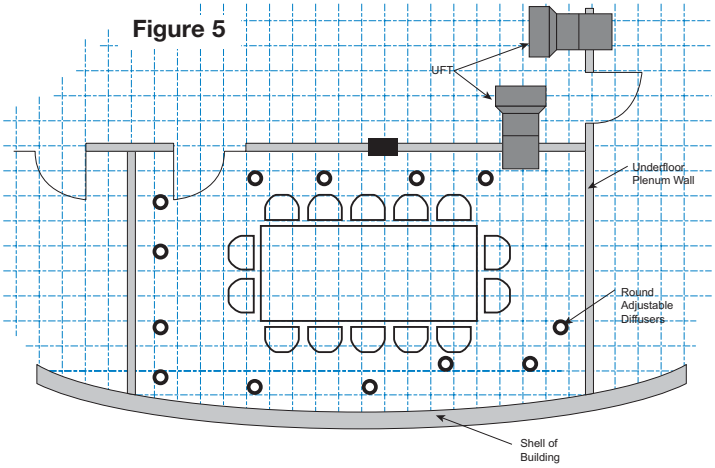


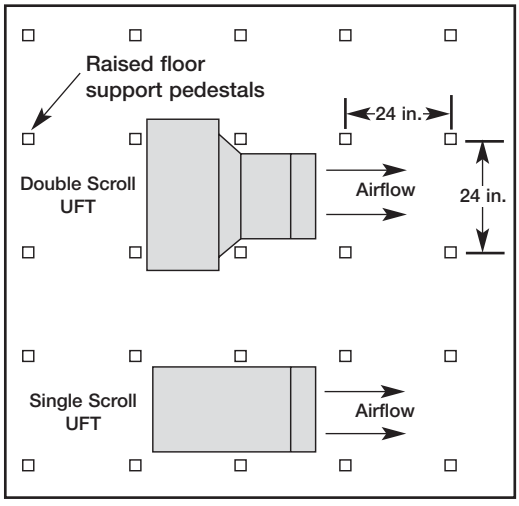
Figure 4

Figure 5



Installation - Fan Placement

Raised floor systems are designed to allow for cables and equipment to be run under the floor. To accomplish this task, the floor is supported with pedestals that are placed 24 inches apart. The UFT is designed specifically for the raised floor application allowing it to fit perfectly between these pedestals while allowing an outlet duct to be attached if desired.



Raised floor heights range from 12 inches and above. Greenheck has designed the UFT in two heights, UFT 10 and UFT 13 to accommodate the various floor heights.

Model	Unit Height	Floor Heights			
		12	14	16	18
UFT 10	10 3/8	x	x	x	x
UFT 13	13 1/8			x	x

VALUE ADDED CONSTRUCTION FEATURES

The primary function of the UFT is to supply air to the perimeter zones of a building allowing for heating when needed. The UFT may also be used to increase air supply to specific interior areas of a building. Greenheck's UFT is constructed for easy service access, and quiet, efficient operation.

UFT 13-2 with hot water heat

UFT 13-2 with electric heat

UFT 13-2 with no coil

Construction and Service

The fan housing and scroll are constructed of corrosion resistant galvanized steel. The fan housing is lined with sound absorbing insulation for quiet operation. Fan wheels are forward-curved centrifugal type. All wheels are dynamically balanced for vibration free operation.

The following UFT features are designed for easy installation and service:

- Easy top access to the blower assembly, reheat coil, and control center for inspection and service
- Main wiring connections are made to a single point to reduce installation time
- Slip and drive duct connections on hot water reheat are standard for quick and easy installation

High Efficiency Variable Speed Motor

Greenheck uses Electronically Commutated Motors (ECM) with efficiencies up to 82%. ECM motors are designed for variable speed operation, while offering moisture resistance, low noise construction and can be programmed to operate as constant volume. Voltages available are 120, 208, 240 and 277. The ultra high efficiency motors are factory adjusted by Greenheck to optimize system performance and operate in variable speed or thermostat mode. An Automation Control Unit (ACU) allows for remote adjustment of motor output with either a 2-10 Vdc control signal or a 4-20 mA control signal, and an easy interface to an automatic temperature controller supplied by others. The ACU controller can also be provided with an RPM output which can be used to monitor unit performance.

Energy efficient variable speed motor

Control Center

The special Greenheck designed control center, equipped with a Nema 1 disconnect switch, can be configured for input voltages of 120, 208, 240 or 277 volts. A transformer provides 24 volt, 25VA of power, for connecting to other devices. Controls can be factory mounted either on the right or left hand side of the fan to facilitate job requirements. Extended control boxes are also available to accommodate field mounted DDC controllers (supplied by others). A 40VA transformer will also be supplied to power the DDC controller.

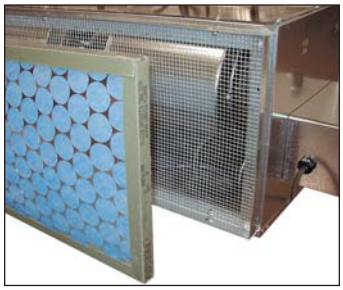
Easy access control center

Mounting and Vibration Isolation

The UFT comes with adjustable mounting brackets and neoprene isolators to reduce vibration. Isolators are sized to match the weight of the individual fan sizes.

Intake Filter

Heavy duty filters are provided for use during building HVAC startup operations to prevent excess dirt from accumulating on the coil, wheels, and motor which could cause a reduction in performance. Filters should be removed shortly after startup to maximize fan performance.


Inlet guard and replaceable filter

Inlet Guard

The inlet guard entirely encloses the inlet side of the fan and is constructed of galvanized steel screen, in a galvanized frame.

Insulation

The UFT fan housing is lined with a standard fiberglass insulation with a tough-skin coating covering. A natural fiber insulation is also available to prevent fiberglass from being in the airstream.

Coil Selections:

The UFT may be selected with or without a heating coil. Reheat coils are available with either hot water or electric coils.

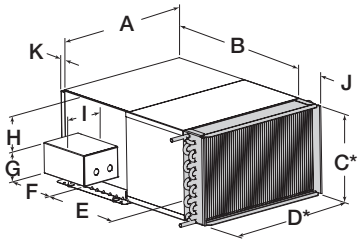
Hot Water Coils

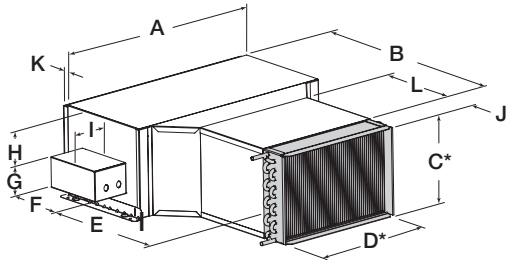
- Coil design is chosen to optimize performance
- Hot water provides quiet and efficient heating of reheat air with a broad range of temperature controls
- Slip and drive connection provides easy duct connection and maximizes free area
- 1 or 2 row coils are available

Electric Coils

- Low installation cost and maintenance
- The UL listed electric heater features open coil heating elements
- One point wiring of motor, coil, and controls
- Airflow fail-safe switch
- SCR Controller
- 24v control
- 1 or 2 stages of heat up to 7.5 kw

HW - Hot Water Coil

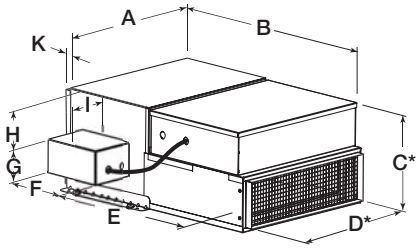


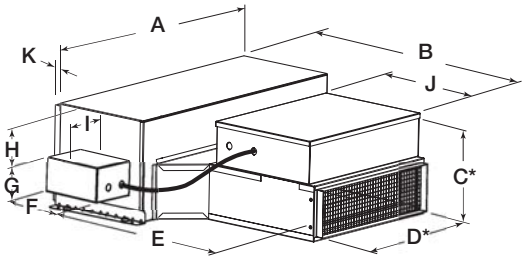


Model	A	B	C*	D*	E	F	G	H	I		J	K	L	WT.	Inlet Duct Connection	Outlet Duct Connection
									Standard	Extended						
UFT 10-1	21	24 3/4	10 3/8	21	15 1/4	12 3/4	4 1/2	3 1/4	6	10	3 3/4	1	-	50	9 3/8 x 20 1/4	10 1/8 x 20 7/8
UFT 10-2	35	30 1/4	10 3/8	21	20 3/4	12 3/4	4 1/2	3 1/4	6	10	3 3/4	1	12	85	9 3/8 x 34 5/8	10 1/8 x 20 7/8
UFT 13-1	21	24 3/4	13 1/8	21	13 3/4	12 3/4	4 1/2	5 1/2	6	10	3 3/4	1	-	60	12 1/8 x 20 1/4	13 x 20 7/8
UFT 13-2	35	30 1/4	13 1/8	21	19 1/4	12 3/4	4 1/2	5 1/2	6	10	3 3/4	1	12	100	12 1/8 x 34 5/8	13 x 20 7/8

* Dimensions C and D are the actual unit height and width. All dimensions are in inches.

EC - Electric Coil





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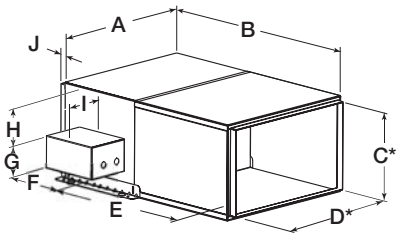
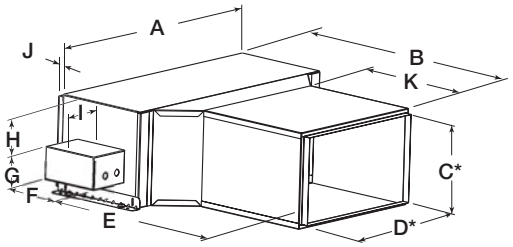
									Standard	Extended					
UFT 10-1	21	29 7/8	10 3/8	21	20 1/2	12 3/4	4 1/2	3 1/4	6	10	-	1	60	9 3/8 x 20 1/4	4 1/2 x 19 7/8
UFT 10-2	35	35 1/2	10 3/8	21	26	12 3/4	4 1/2	3 1/4	6	10	15	1	95	9 3/8 x 34 5/8	4 1/2 x 19 7/8
UFT 13-1	21	29 7/8	13 1/8	21	19	12 3/4	4 1/2	5 1/2	6	10	-	1	70	12 1/8 x 20 1/4	6 1/8 x 19 7/8
UFT 13-2	35	35 3/8	13 1/8	21	24 1/2	12 3/4	4 1/2	5 1/2	6	10	15	1	110	12 1/8 x 34 5/8	6 1/8 x 19 7/8

* Dimensions C and D are the actual unit height and width. All dimensions are in inches.

NC - No Coil





Model	A	B	C*	D*	E	F	G	H	I		J	K	WT.	Inlet Duct Connection	Outlet Duct Connection
									Standard	Extended					
UFT 10-1	21	29 7/8	10 3/8	21	20 3/8	12 3/4	4 1/2	3 1/4	6	10	1	-	40	9 3/8 x 20 1/4	9 1/8 x 19 7/8
UFT 10-2	35	35 1/4	10 3/8	21	20 7/8	12 3/4	4 1/2	3 1/4	6	10	1	17	75	9 3/8 x 34 5/8	9 1/8 x 19 7/8
UFT 13-1	21	29 7/8	13 1/8	21	18 7/8	12 3/4	4 1/2	5 1/2	6	10	1	-	50	12 1/8 x 20 1/4	11 7/8 x 19 7/8
UFT 13-2	35	35 3/8	13 1/8	21	24 3/8	12 3/4	4 1/2	5 1/2	6	10	1	17	90	12 1/8 x 34 5/8	11 7/8 x 19 7/8

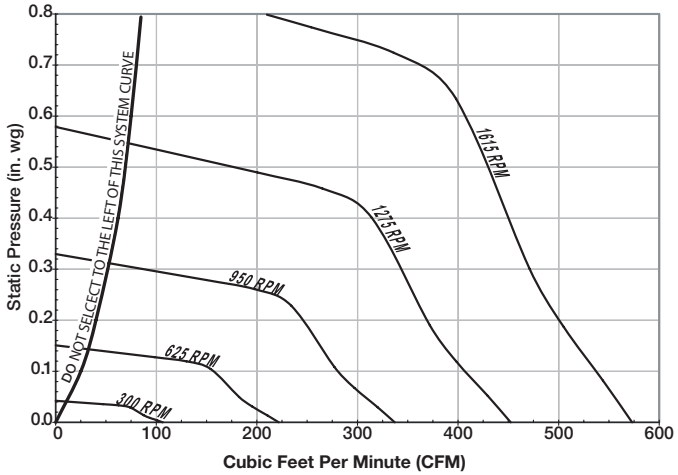
* Dimensions C and D are the actual unit height and width. All dimensions are in inches.

PERFORMANCE - STANDARD

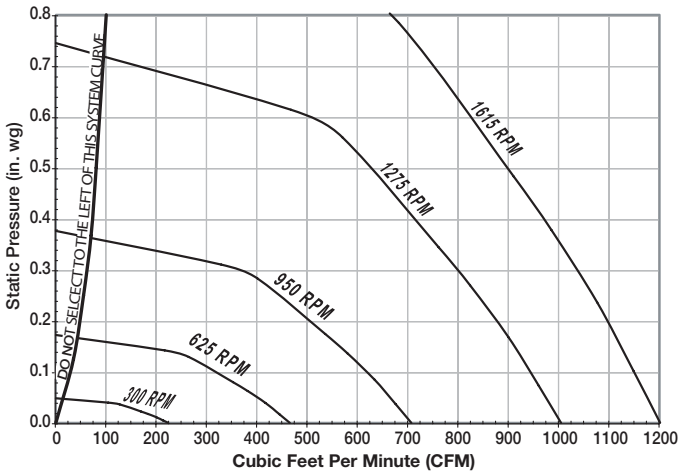
Model	RPM	HP	Static Pressure In Inches of WG									Radiated Sound NC Level	Discharge Sound Max NC Level
			CFM	0	0.125	0.25	0.375	0.50	0.625	0.75	0.875		
UFT 10-1	1615	1/3	CFM	573	528	487	447	420	399	294		23	29
UFT 10-2	1615	1/2	CFM	1201	1136	1067	988	903	850	770	496	25	36
UFT 13-1	1365	1/3	CFM	823	801	749	690	620	525	397	277	28	29
UFT 13-2	1365	1/2	CFM	1817	1739	1649	1561	1433	1292	1103	855	29	36

Performance chart displays data corrected to the given RPM. Fan tested under a 16 inch raised floor at 0 in. wg in an accredited sound chamber. *Radiated sound values are dependent on RPM, inlet and outlet pressures. Consult CAPS for sound data for your application.*

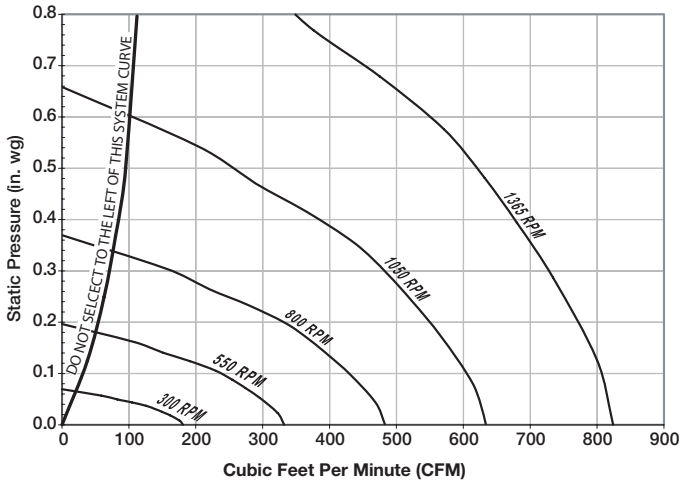
UFT 10-1 Standard Performance



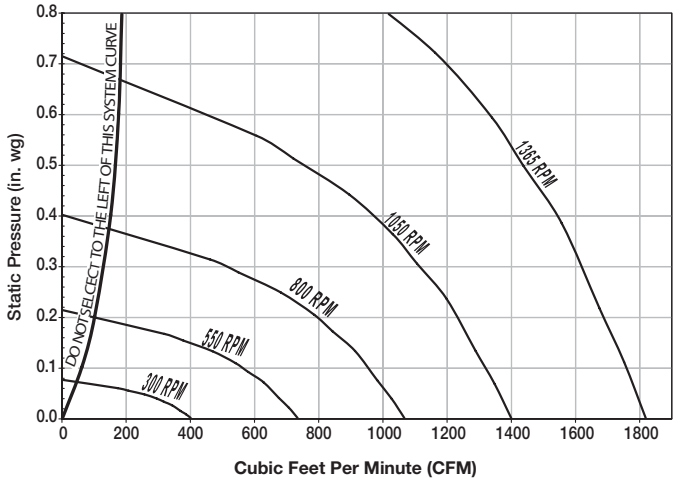
UFT 10-2 Standard Performance



UFT 13-1 Standard Performance



UFT 13-2 Standard Performance



Performance shown is for Model UFT for installation type B: Free inlet, Ducted outlet. Performance ratings include the effects an insulated housing, air passing over the inlet guard and through the hot water coil. Speed (RPM) shown is nominal. Performance is based on actual speed of test.

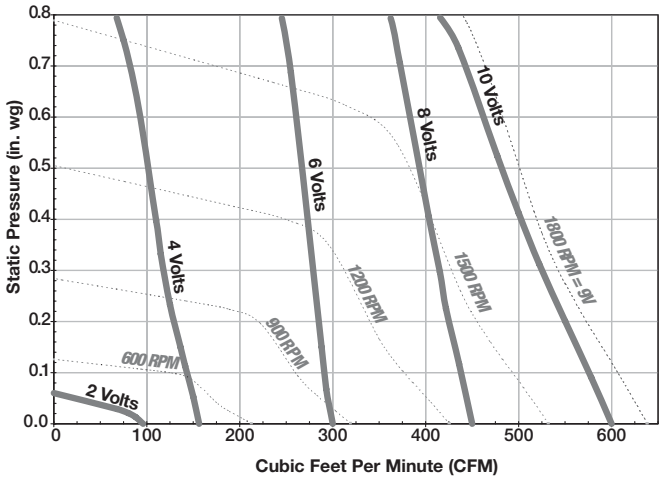
PERFORMANCE - CONSTANT VOLUME

UFT fans can be selected and programmed to operate as Constant Volume. The Constant Volume mode is obtained by using a special motor program. When the program senses any changes in static pressure it will increases or decreases the motor speed to obtain the desired CFM.

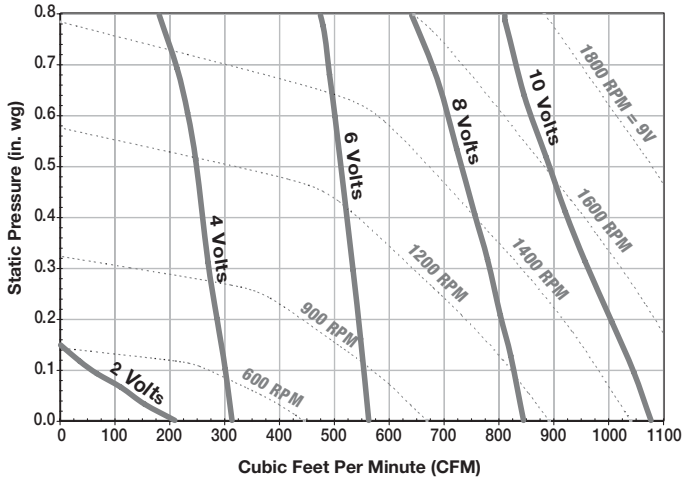
Below are the Constant Volume charts for each UFT fan size. The charts axis's are labeled CFM and Static Pressure. Notice each chart has two sets of lines. The dotted line indicates the fan RPM and the solid line indicates the control voltage input. The control voltage is a 2 to 10 volt signal used to control the performance of the fan. By changing the input voltage you will change the fans performance. For example, if you are inputting a 6 volt control signal to the UFT 13-2, the fan will perform around 850 cfm. The static pressure will not affect the CFM of the fan, however, it will affect at what RPM the fan runs. If the static pressure is at 0.28 in. wg the motor will be running at 900 rpm, but if the static pressure increases to 0.62 in. wg. the motor will be operating at 1200 rpm. At both static pressures the fan will be delivering air at 850 cfm.

Approximate Fan Performance at Specified Static Pressure

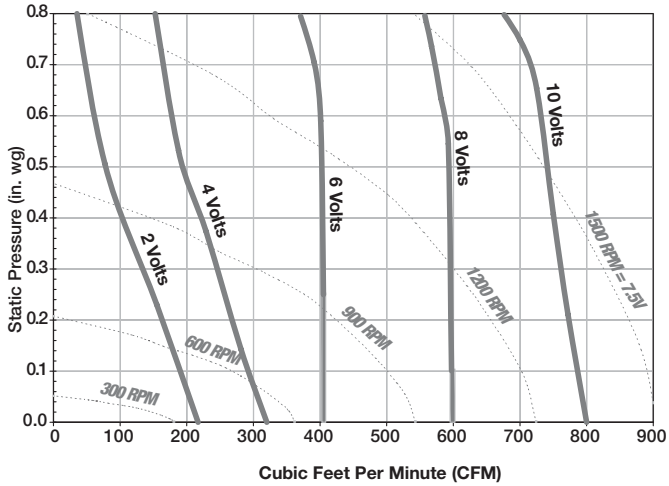
UFT 10-1 Constant Volume



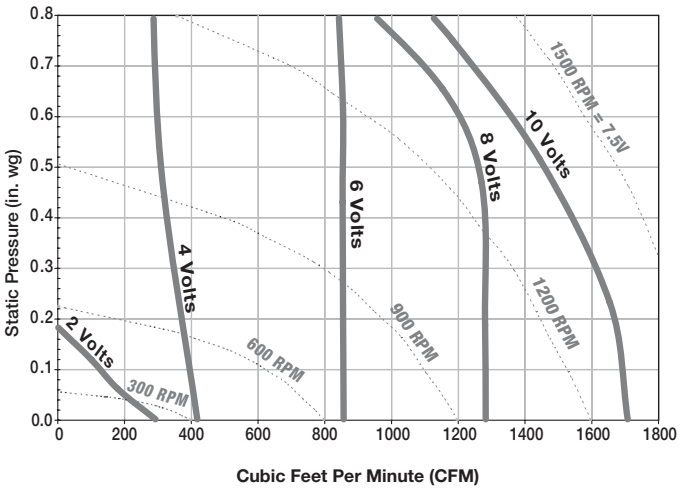
UFT 10-2 Constant Volume



UFT 13-1 Constant Volume



UFT 13-2 Constant Volume



Radiated Sound

HW - Hot Water Coil

Model	Fan Speed CFM	Sound Pressure Levels (average room) Octave Bands								NC Level
		1	2	3	4	5	6	7	8	
UFT 10-1	535	42	39	32	22	24	19	14	14	23
UFT 10-2	1086	46	43	35	29	27	21	16	15	25
UFT 13-1	756	45	41	35	28	29	24	17	15	28
UFT 13-2	1565	48	47	38	31	29	23	18	18	29

Fan tested under a 16 inch raised floor at 0 in. wg in an accredited sound chamber. *Radiated sound values are dependent on RPM, inlet and outlet pressures. Consult CAPS for sound data for your application.*

EC - Electric Coil

Model	Fan Speed CFM	Sound Pressure Levels (average room) Octave Bands								NC Level
		1	2	3	4	5	6	7	8	
UFT 10-1	535	44	41	33	22	22	18	16	16	21
UFT 10-2	1161	48	46	36	29	25	19	17	17	28
UFT 13-1	777	47	43	36	28	27	23	18	18	25
UFT 13-2	1615	50	49	38	30	27	21	19	19	32

Fan tested under a 16 inch raised floor at 0 in. wg in an accredited sound chamber. *Radiated sound values are dependent on RPM, inlet and outlet pressures. Consult CAPS for sound data for your application.*

NC - No Coil

Model	Fan Speed CFM	Sound Pressure Levels (average room) Octave Bands								NC Level
		1	2	3	4	5	6	7	8	
UFT 10-1	535	44	41	33	22	22	18	16	16	21
UFT 10-2	1161	48	46	36	29	25	19	17	17	28
UFT 13-1	777	47	43	36	28	27	23	18	18	25
UFT 13-2	1615	50	49	38	30	27	21	19	19	32

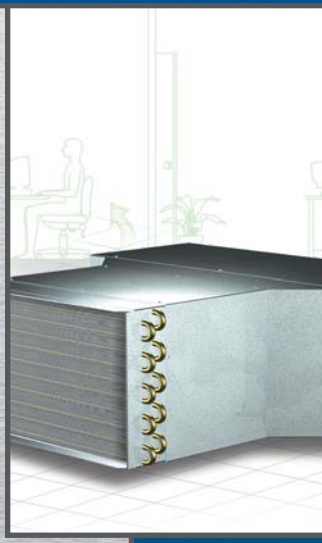
Fan tested under a 16 inch raised floor at 0 in. wg in an accredited sound chamber. *Radiated sound values are dependent on RPM, inlet and outlet pressures. Consult CAPS for sound data for your application.*

Discharge Sound

Model	Sound Pressure Levels, dB Octave Bands								Max NC Level
CFM	1	2	3	4	5	6	7	8	
220	52.3	44.0	36.2	33.1	29.9	25.2	18.9	15.5	29
385	56.1	47.9	43.2	39.9	33.0	30.0	27.0	19.9	36

The sound ratings shown are five feet from the linear grille. Discharge is through a 5 in. x 36 in. aluminum, fixed bars, pencil proof diffuser with 0° deflection ($^{7}/_{16}$ in. spacing and $^{7}/_{32}$ in. bars).

Indoor Air Handlers



Greenheck's Indoor Air Handling Series, models MSCF, LFC and VFC, provide air conditioning and/or heating for buildings and specific spaces. The series was designed with low-profile construction to fit within tight spaces in applications such as schools, office buildings, apartments, medical facilities and many other commercial applications. Each model has a variety of sizes and a wide performance range with quiet, trouble free operation.

Modular Indoor Air Handler
Model MSCF-FC
Model MSCF-BI

Modular construction allows the design engineer to configure a unit to meet their exact requirements. The modular construction also makes the MSCF ideal for retrofit applications.

Horizontal Fan Coil
Model LFC-FC

A horizontal fan coil unit is ideal for price sensitive applications. The LFC, all in one construction, results in a shorter unit which is ideal for space constrained applications.

Vertical Fan Coil
Model VFC-FC

A vertical fan coil unit, all in one construction, is ideal for providing cooling and/or heating for applications requiring a small footprint.

Building Value in Air

Greenheck delivers value to mechanical engineers by helping them solve virtually any air quality challenges their clients face with a comprehensive selection of top quality, innovative air-related equipment. We offer extra value to contractors by providing easy-to-install, competitively priced, reliable products that arrive on time. And building owners and occupants value the energy efficiency, low maintenance and quiet dependable operation they experience long after the construction project ends.

Our Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.
As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

GREENHECK
Building Value in Air.

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