

Laboratory Exhaust System Model TCB-LE



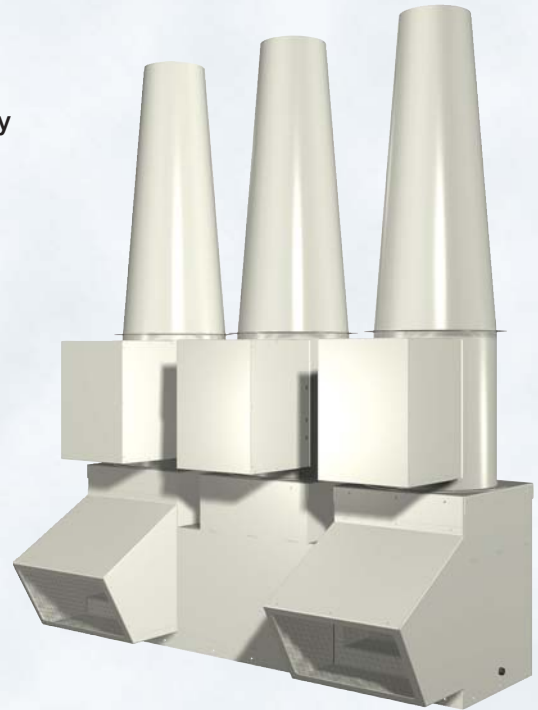
 **GREENHECK**
The Solution Company.

October 2003

Laboratory Exhaust System TCB-LE

The Greenheck TCB-LE is a cost effective, self-contained laboratory exhaust system, which offers the following benefits:

- Model TCB Tubular Centrifugal Fan is licensed to bear the AMCA Seal for sound and air performance
- AMCA class B spark resistant construction
- Belt drive flexibility
- Application to constant or variable volume exhaust systems
- Efficient discharge nozzle design
- Corrosion resistant polyester resin coating
- Ease of maintenance
- Flow applications from 500 - 24,000 CFM @ 4 in. tsp per fan
- Meets ANSI Z9.5 and ASHRAE guidelines



Why use Greenheck's TCB-LE?

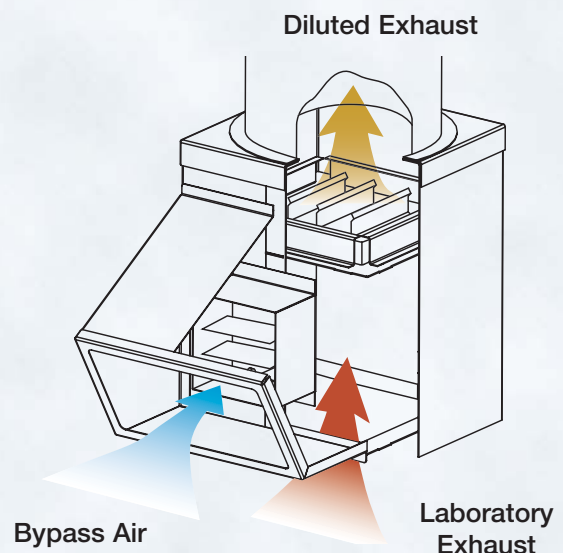
The main objective of a laboratory exhaust system is to remove hazardous or noxious fumes from a laboratory, dilute the fumes as much as possible and expel them from the lab building so that the fumes do not contaminate the roof area nor are re-entrained into building make-up air systems.

The Greenheck TCB-LE is a laboratory exhaust **system** that has been designed to be a **cost effective alternative**, offering single source responsibility over standard field built-up fan and stack assemblies.

Through the application of a high velocity exhaust cone incorporated in the Greenheck TCB-LE, the laboratory fumes are accelerated to a high velocity, giving the exhaust additional momentum to be displaced high above the roof. Compared to other systems, the TCB-LE does **not** incorporate a hinged discharge cover, which can impede exhaust flow, and which is not recommended by ASHRAE stack design guidelines (2003 ASHRAE Applications handbook, Section 44.2).

In addition, the TCB-LE offers an optional bypass air plenum and damper that can be used to add additional ambient air to the exhaust of a constant volume lab exhaust system. This additional bypass air increases the dilution of the exhaust effluent, and also increases the exhaust momentum, resulting in greater exhaust displacement above the roof.

On variable volume systems, the bypass air plenum and damper allows a reduction of lab exhaust by bleeding ambient air to the exhaust fan, while the fan runs at constant RPM and CFM, and without the need for a variable frequency drive. Greenheck can provide the bypass air damper with the required electronic or pneumatic damper actuator, factory mounted.



Ease of Maintenance

The Greenheck TCB-LE laboratory exhaust system provides safe, easy inspection and maintenance of internal fan components. By removing one access panel, service to the fan wheel, shaft and bearing assembly is accomplished without removing the fan from the system.



Construction Features

- The impeller of the Greenheck TCB-LE is manufactured of corrosion resistant coated aluminum, and is AMCA type “B” spark resistant construction, a necessity for laboratories that exhaust flammable and explosive solvent vapors.
- The Greenheck TCB-LE is belt driven, which not only offers safe and easy motor replacement without accessing the contaminated interior of the blower, but also offers the ability to compensate for system static pressure variations (balancing) and future system performance changes.
- A longer, tapered discharge nozzle reduces system effects associated with a quick or abrupt reduction in the discharge stack diameter.
- A drain integral to the fan housing, allows for removal of any rain water or condensation. An additional drain is located in the optional bypass air plenum.
- Bypass air dampers are optimized for the volume of lab exhaust air and fan size. Each damper is sized for the configuration. Damper controls can be factory provided and mounted or installed in the field.

Adjusting for Plume Height

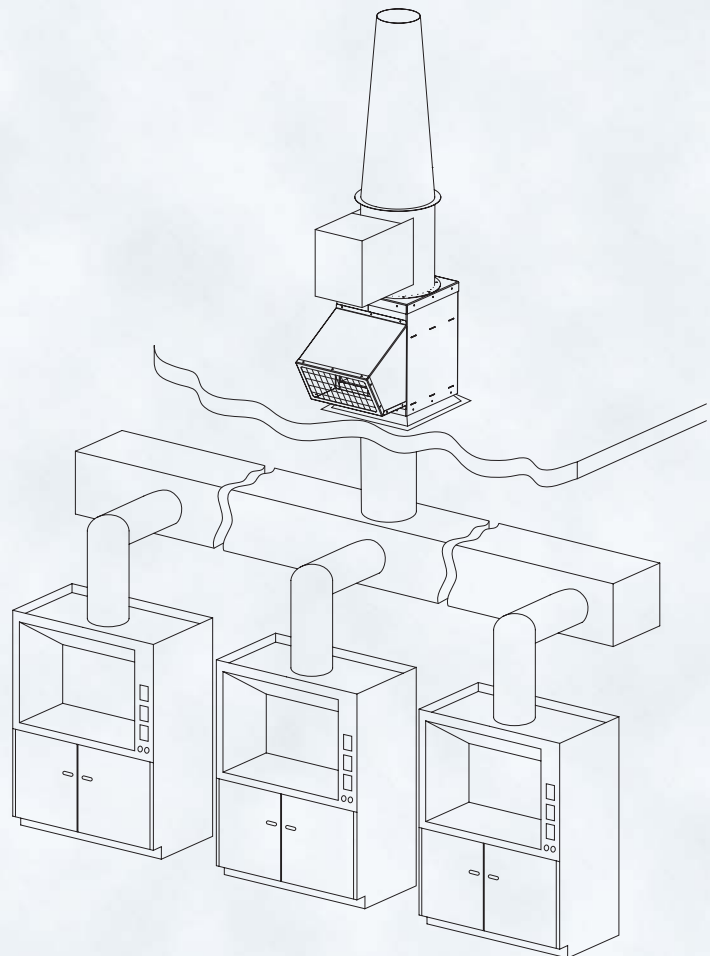
Adjusting the fan system to have additional throw or plume height is achieved by increasing the volume of air through the discharge nozzle. Increased mass increases exhaust flow momentum carrying the diluted exhaust higher. Simply increasing the fan speed through a pulley change, will increase the fan’s volume capacity. The additional air comes from the increase in the lab exhaust or an increase in air through a bypass air damper. An additional benefit of utilizing the bypass air damper is increased dilution of the exhaust air.

Abridged Performance Table

Size	CFM		Plume Rise Above Roof (ft)	
			3000 fpm	6000 fpm
9	Min	500	17	18
	Max	1,600	20	23
10	Min	700	17	19
	Max	2,000	21	24
12	Min	1,100	18	20
	Max	2,800	22	25
13	Min	1,600	20	23
	Max	3,400	24	27
16	Min	2,400	21	25
	Max	5,500	27	33
18	Min	2,500	23	25
	Max	5,800	27	33
22	Min	3,500	24	28
	Max	8,000	29	37
24	Min	5,500	27	33
	Max	12,000	34	42
30	Min	7,000	30	36
	Max	15,000	38	48
36	Min	10,000	35	42
	Max	24,000	46	58

Note:

- Minimum CFM per minimum discharge velocity, ANSI Z9.5
- Plume rise calculation @ 10 mph wind per ASHRAE Applications Handbook



The Greenheck TCB-LE laboratory exhaust system can be applied to single as well as multiple manifolded fume hoods, as shown above.

Plume Height

It is important that the exhaust plume height be great enough to avoid re-entrainment of exhaust air and to disperse the exhaust. The effective stack height should be used when analyzing design issues. The effective stack height of a fume exhaust system (h_e) is the physical height of the fan system (h_s) plus the plume rise (h_r), found from the equation below.

The plume rise height from an exhaust stack, with no hinged raincap, can be calculated using the following equation*:

$$h_r = 3.0 \times (V \times d / U)$$

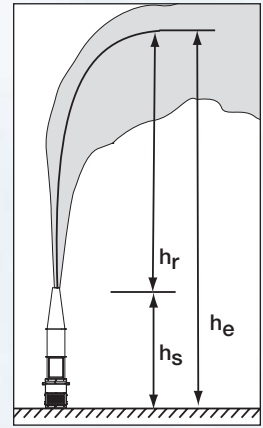
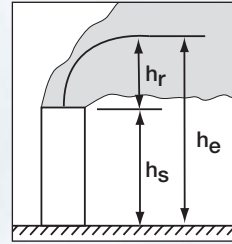
h_r = plume rise, ft (m)

V = Stack exit velocity, fpm (m/s)

d = stack diameter, ft (m)

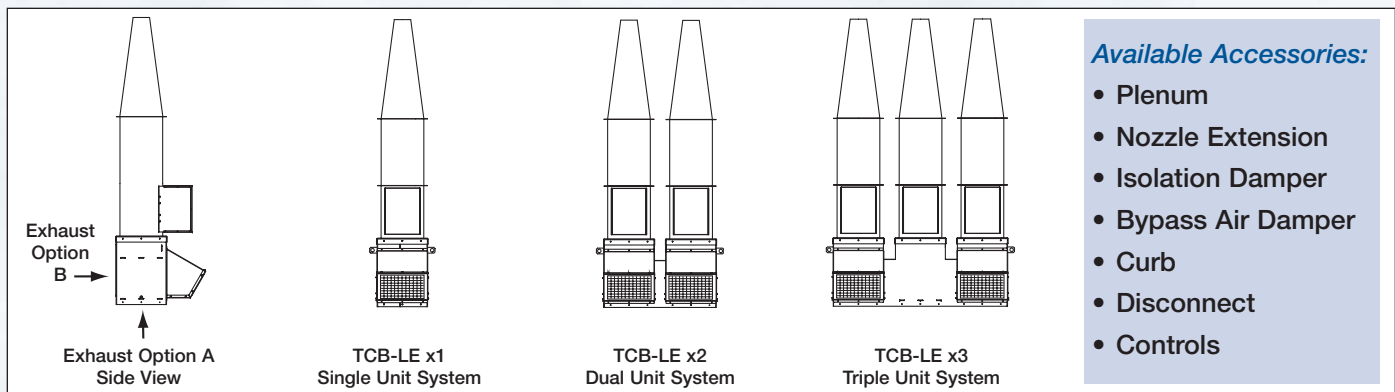
U = wind speed, fpm (m/s)

* From ASHRAE Laboratory Design Guide, Equation 9-2



System Configuration

Detailed layout and dimensions, as well as specifications, are available for the TCB-LE fume exhaust system in various configurations.



Warranty

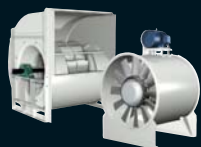
Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid.

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.

Due to continuing research, Greenheck reserves the right to change specifications without notice.



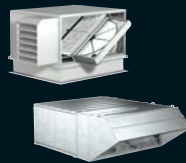
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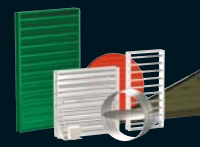
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