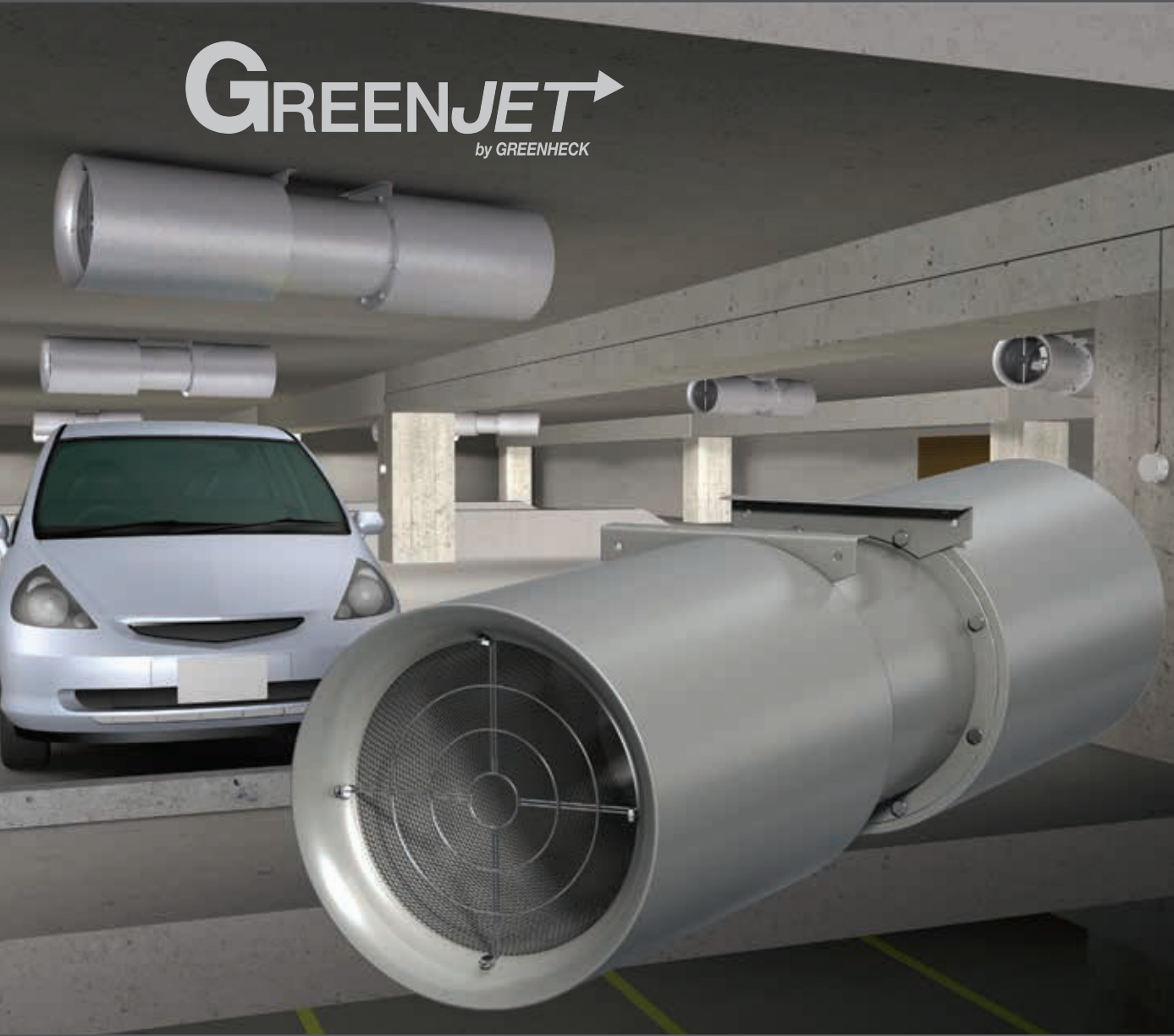


GreenJet® Transfer Fans Model GJX

High Performance Axial Transfer Fan



BUILDING VALUE IN AIR.



April
2018

As cars park in an underground parking structure, carbon monoxide (CO) and other noxious fumes are emitted into the atmosphere. There is a need for an efficient ventilation system to remove these toxins, circulate fresh air into the car park, and assist firefighters with smoke control in the case of a fire emergency. The GreenJet® model GJX includes a range of performances to accommodate your needs for parking garage ventilation.

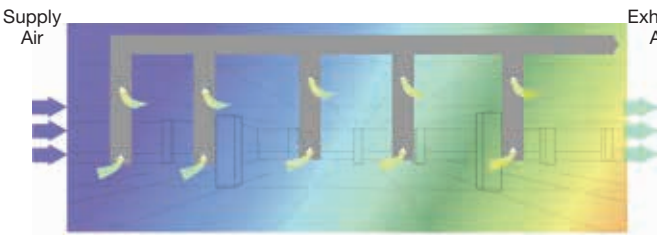
While ducted ventilation has been the standard for many years, innovation in technology has shifted systems toward ductless designs. Ductless designs use transfer fans to dilute and remove contaminants and control the smoke. In addition, these systems provide greater control and operational savings.



Improved Exhaust Effectiveness with GreenJet

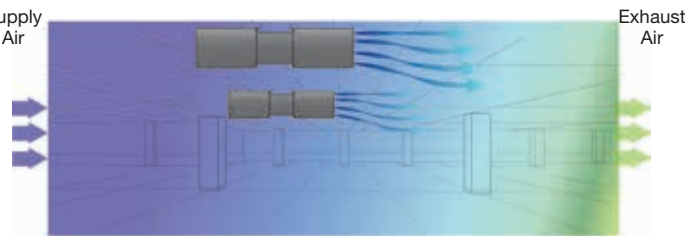
Ducted System

Fresh air intended to replace contaminated exhaust is removed along with contaminants through each duct. The illustration below shows ducts closer to the supply air remove much of the fresh air, leaving mostly toxic air at the farthest duct, causing a hazardous condition.



Ductless with GreenJet Transfer Fans

GreenJet transfer fans push fresh supply air through the parking area towards the exhaust fan(s). This removes a higher proportion of contaminated air and replaces it with clean air.



Carbon Monoxide (CO) Contaminate Concentration Level



Advantages:

- **Simplified Design:** Eliminates the need and expense of designing a duct system.
- **Lower Construction Cost:** GreenJet fans require less height against the ceiling than a ducted system. This means the required height of each level is less, reducing excavation and lowering overall construction cost.
- **Lower Installation Cost:** A typical GreenJet system results in less installation time.
- **Improved Operational Costs:** Eliminating ductwork reduces the system static pressure and allows for smaller supply and exhaust fans to run using less power. The use of third-party exhaust sensors allows for demand-based ventilation.
- **Reduced Maintenance:** GreenJet fans are more accessible for maintenance than traditional systems, and eliminate duct cleaning.
- **Enhanced Safety:** GreenJet fans are more efficient at removing noxious fumes and clearing smoke, resulting in a safer environment.



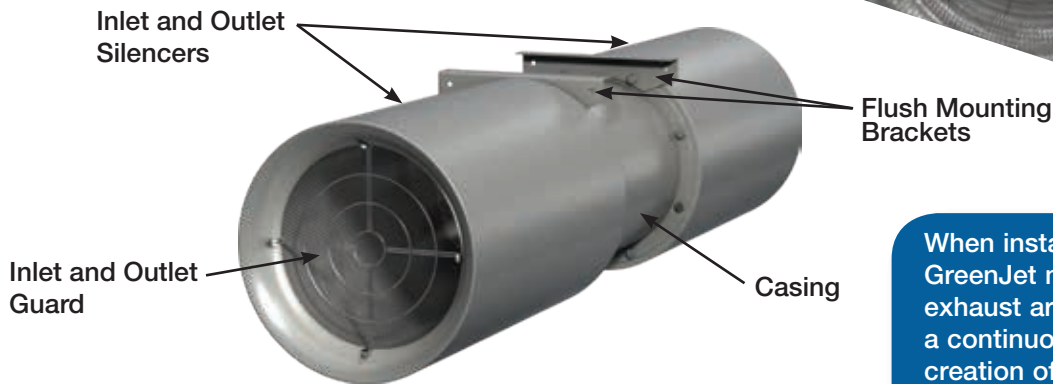
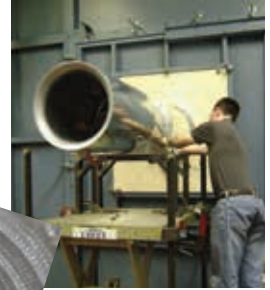
UL/cUL 705 Listed Power Ventilator
File No. E40001

UL/cUL Power Ventilator for Smoke Control Systems
File No. MH17511

AMCA licensed air performance may be found in Greenheck's Computer Aided Product Selection program (CAPS).

GreenJet model GJX is a low profile, quiet fan suspended from the ceiling. Construction features include:

- Durable steel casing with Permatector™ coating for corrosive environments
- Mounting brackets flush with the top of the silencers for no additional height
- Airfoil propellers move large volumes of air with high efficiency in a small diameter fan
- Sound absorbing inlet and outlet silencers with perforated inner liner for maximum sound reduction
- Aerodynamic inlet design improving performance efficiency.



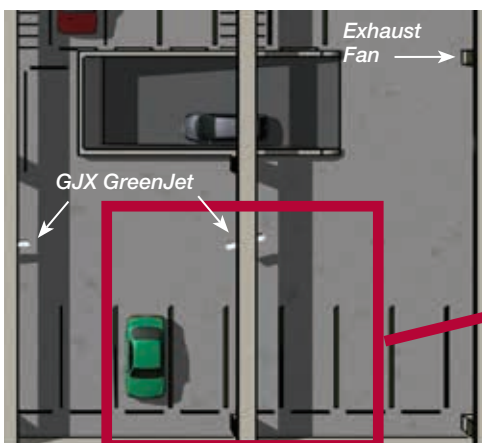
When installed ceiling hung, GreenJet moves the air towards the exhaust area by effectively creating a continuous flow, avoiding the creation of stagnant zones where air may become trapped.

Ductless Garage Ventilation: Supply – Transfer – Exhaust

Typical installation and operation of ductless, enclosed parking garage HVAC systems consist of supply fans, GJX GreenJet fans, and exhaust fans.

Under normal conditions, fresh air is introduced into the garage through entrance/exit ramps and through a dedicated supply fan. The GreenJet model GJX fans are positioned to direct air from one end of the garage to the other, supplying fresh air to the structure while also mixing and pushing contaminated air towards the point of exhaust (typically on the end opposite the supply). An exhaust fan removes the contaminated air from the garage. A timer, occupancy monitor, or demand-based control system can operate the entire system.

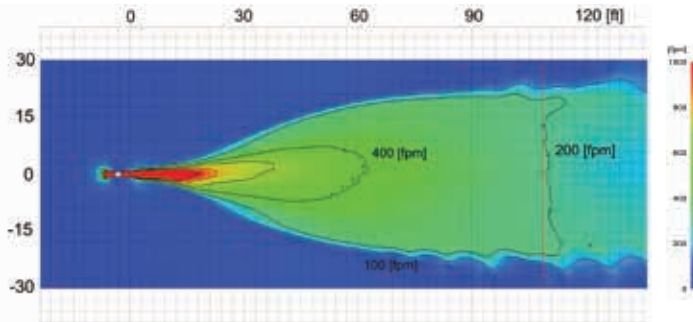
The GJX fans are available with Smoke Control certification for integration into a smoke exhaust control system. GJX is intended to provide emergency responders a clear path for better and more effective access.



Fan Placement and Velocity Profiles

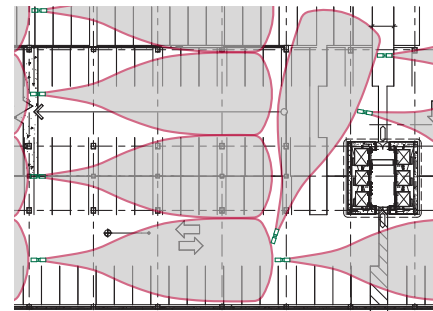
Successful operation requires the correct fan quantities, placement, and direction of the transfer fans.

Discharge velocity profiles is a tool to provide a starting point for initial fan placement. GreenJet velocity profiles are available for integration in an AutoCAD® layout. The images below show the use of Computational Fluid Dynamics (CFD) to develop a 200 fpm velocity profile and integration into a design layout.



CFD velocity profile for a GJX-41 showing 200 fpm throw of 110 ft (33 m).

Car park layout with GJX velocity profiles added giving initial placement locations.

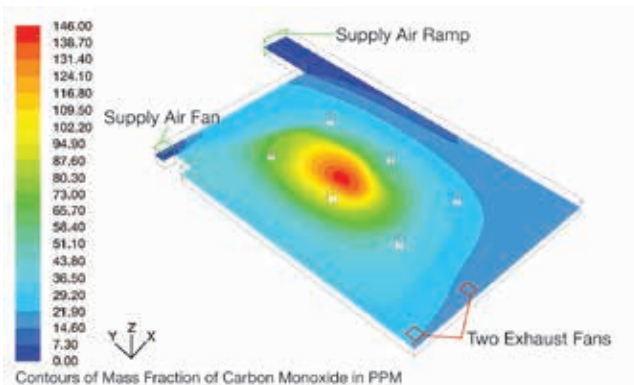


CFD Analysis

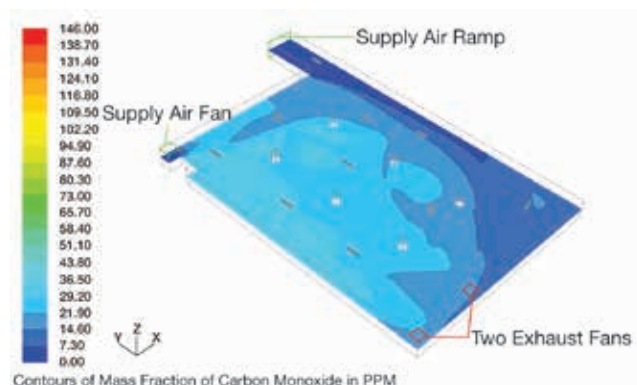
There are different CFD analyses often used in parking garages:

- Velocity analysis provides information on air movement but not the effect on contaminate removal.
- CO analysis provides the effectiveness in removing contaminants from the parking garage.
- Smoke removal analysis shows how quickly and effectively smoke is removed from the source point.

Natural airflow paths from supply to exhaust locations exist within a building structure. Integrating transfer fans moves air outside of these pathways. An analysis on CO levels illustrates the impact of the GJX GreenJet fan installation on a parking garage.



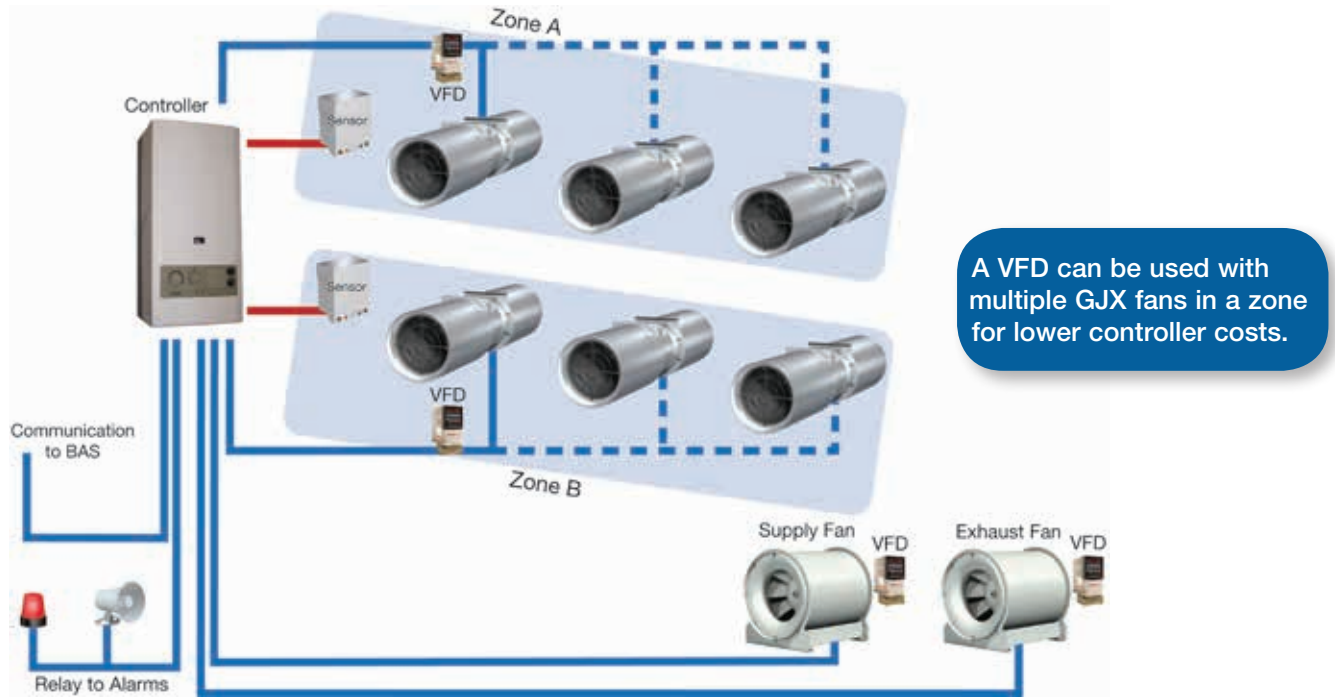
Without Jet Fans



With Jet Fans

Integration of GreenJet model GJX fans into Demand-Based Application

A demand-based system is controlled using sensors that measure parts per million (ppm) of contaminants and sends information to the the facilities controller to increase or decrease speed based on actual conditions. The image below shows how the GJX GreenJet is integrated into this application.



Energy Saving with Demand-Based Ventilation

There are two methods for controlling parking ventilation systems; an On/Off system where the ventilation is on a timer or occupancy sensor, or demand-based with sensors changing the ventilation rate with contaminate levels.

Simplified Example:

Control Method	Operation	Ventilation Rate* (cfm per ft ² of garage floor)	Operating Time (hours)	Daily Operating Volume (ft ³ per ft ² of garage floor)
On / Off	Full	0.75	12	540
Demand-Based	Full	0.75	2 (average)	180
	Reduced	0.15	10	

*Full flow uses a 0.75 cfm/ft² (ASHRAE 62.1-2013) ventilation rate per square foot for garage area and reduced flow using 0.15 cfm/ft² (California Title 24).

In this example, a demand-based method results in a 66% reduction in the ventilation requirement and related energy savings.

Five times the difference in prescribed ventilation rates between systems with and systems without air quality monitoring and control.

Performance and Dimensional Data

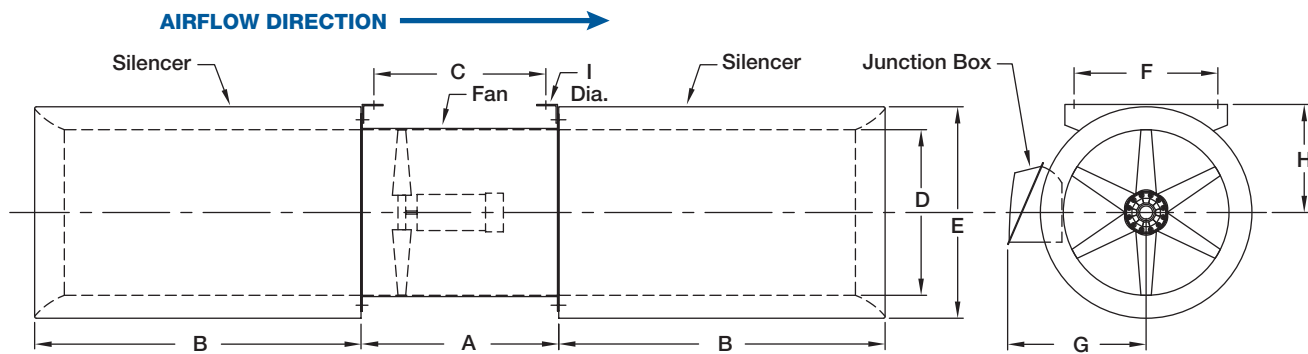
Fan Size	Airflow cfm (m ³ /hr)	Thrust lbs (N)*	Throw ft (m)**	Power Bhp (kW)	Motor Size HP (kW)	Motor Speed	dBA Inlet @ 5 ft
GJX-31-160-0634	2,640 (4,485)	5.6 (24.9)	85 (25.9)	1.26 (0.94)	1.50 (1.1)	3500	71
GJX-31-160-0625	2,250 (3,823)	4.1 (18.2)	75 (22.9)	0.74 (.55)	0.75 (0.56)	3500	69
GJX-36-160-0627	4,070 (6,915)	9.9 (44.0)	100 (30.5)	1.94 (1.45)	2.00 (1.5)	3500	73
GJX-36-160-0622	3,620 (6,150)	7.8 (34.7)	90 (27.4)	1.48 (1.1)	1.50 (1.1)	3500	74
GJX-41-160-0623	6,010 (10,211)	16.6 (73.8)	115 (35.1)	2.94 (2.19)	3.00 (2.2)	3500	77
GJX-41-160-0616	5,050 (8,580)	11.7 (52.0)	105 (32.0)	1.95 (1.45)	2.00 (1.5)	3500	78

*Air density = 0.075 lb./ft³

**Throw distance for 200 ft/min

The performance shown is not AMCA licensed as it includes losses from appurtenances (accessories) in the airstream. Licensed data may be found in Greenheck's Computer Aided Product Selection program (CAPS).

Dimensional Data

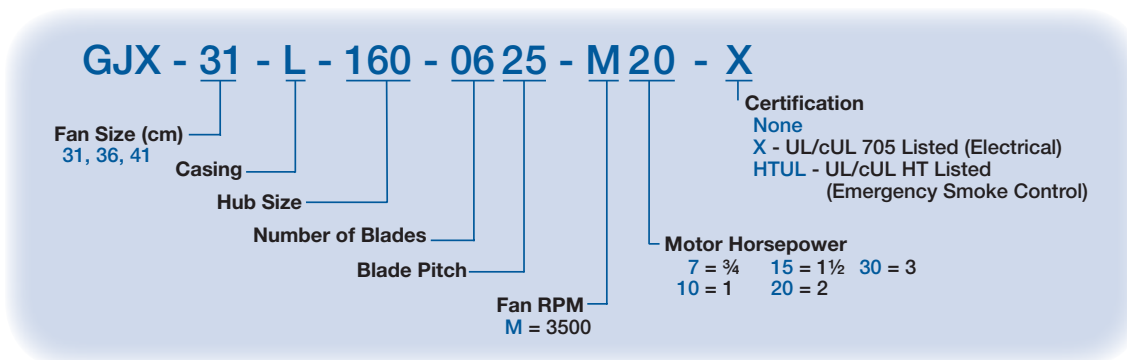


Size (cm)	A	B	C	D	E	F	G	H	I	Weight* lbs. (kg)
31	17.01 (432)	24.49 (622)	14.80 (376)	12.24 (311)	16.18 (411)	10.28 (261)	10.04 (255)	8.31 (211)	0.47 (12)	143 (65)
36	17.01 (432)	28.50 (724)	14.80 (376)	14.25 (362)	18.19 (462)	12.28 (312)	11.02 (280)	9.29 (236)	0.47 (12)	152 (69)
41	20.00 (508)	32.52 (826)	17.81 (452)	16.26 (413)	20.20 (513)	14.29 (363)	12.05 (306)	10.31 (262)	0.47 (12)	170 (77)

Dimensions shown in inches (millimeters).

*Weight includes largest motor for size.

Model Number Code



Emergency High Temperature Smoke Removal

The GreenJet model GJX is UL Listed for Smoke Control. It is high temperature performance tested and rated for design time used in emergency heat and smoke exhaust applications.

Emergency Temperature Options:

- 150°C / 5 Hours (302°F / 5 Hours) - per British Standard 7346 (Components for smoke control systems)
- 260°C / 4 Hours (500°F / 4 Hours) - per Industrial Risk Insurers (North America)



UL/cUL Power Ventilator for Smoke Control Systems
File No. MH17511

Life Safety Dampers

Life safety dampers are intended to protect openings in walls, ceilings, floors and/or partitions to prevent the spread of fire and/or smoke. These are necessary in multi-level car parks with common shafts to prevent the spread of smoke from one floor to another.

Fire dampers are required by all building codes to maintain the required fire resistance ratings of walls, partitions and floors when penetrated by air ducts and transfer openings. These products were tested and classified in accordance with UL Standard 555.

Smoke Dampers have two applications:

1. These may be applied in a passive smoke control system where they simply close and prevent the circulation of air and smoke through a duct or a ventilation opening in a smoke barrier.
2. These may be applied as part of an engineered smoke control system designed to control the spread of smoke using walls and floors as barriers and using the building's HVAC system and/or dedicated fans to create pressure differences.

These products are tested and classified in accordance with UL Standard 555S.

Combination Fire Smoke Dampers perform the function of both a fire damper and a smoke damper. Building layouts and designs often combine fire and smoke rated partitions and barriers requiring the installation of both a fire damper and smoke damper at the same location. These products are tested and classified in accordance with both UL 555 and UL 555S.



Supply and Exhaust Fans

Greenheck's high performance fans are ideal for air ventilation in commercial, industrial or institutional buildings. Design and construction are well suited for indoor or outdoor applications and can be easily installed in ducted or non-ducted systems. Fans are designed to reduce operating costs with improved efficiency.

- AMCA Licensed Performance
- UL/cUL Listed for Electrical 705
- UL/cUL Listed for Power Ventilators for Smoke Control Systems
- Spark resistant construction



Design and Selection Support

Enjoy Greenheck's extraordinary service, before, during and after the sale.

QUICK
DELIVERY



CAPS



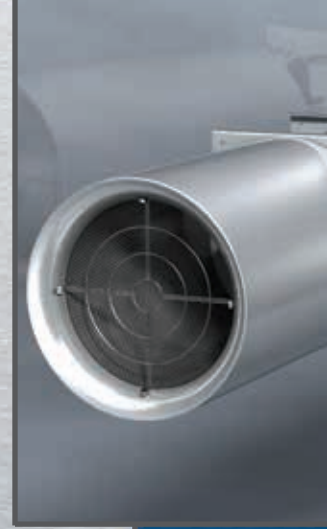
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Greenheck offers added value to our wide selection of top performing, energy-efficient products by providing several unique Greenheck service programs.

- Our **Quick Delivery** Program ensures shipment of our in-stock products within 24 hours of placing your order. Our **Quick Build** made-to-order products can be produced in 1-3-5-10-15- or 25 day production cycles, depending upon their complexity.
- Greenheck's free **Computer Aided Product Selection** program (CAPS), rated by many as the best in the industry, helps you conveniently and efficiently select the right products for the challenge at hand.
- Greenheck has been **Green** for a long time! Our energy-saving products and ongoing corporate commitment to sustainability can help you qualify for LEED credits.
- Our **3D service** allows you to download at no charge, lightweight, easy-to-use AutoDesk® Revit® 3D drawings for many of our ventilation products.

Find out more about these special Greenheck services at greenheck.com



Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.



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