



Picture shows a standard AMCA 250 suspended thrust test for a jet fan for the City of Atlanta Archer Western contract. Clarage will also complete this test on a thrust table for larger units.



Impeller for the Canada Line project.



Jet fan installed in the Washington Dulles Airport.



A NYCT axial fan set up on an AMCA 210 test stand.

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# *The Leader in Tunnel Ventilation*



**Clarage**

**A Twin City Fan Company**

# Tunnel Ventilation

## TUNNEL VENTILATION

Clarage – the leader in tunnel ventilation – manufactures industrial and heavy-duty centrifugal and axial fans, exhausters, ventilators and emergency smoke equipment.

Founded in 1874, Clarage is the oldest operating fan company in the United States. Our history, reputation and market expertise make us uniquely qualified to provide custom designed air movement products of exceptional quality and value. This history, coupled with our state-of-the-art test and manufacturing facility, our project management and engineering, means you will get your fans built to your specifications when you need them.

## APPLICATIONS

**Road Tunnels** require powered ventilation for control of smoke in case of fire and to remove pollution caused by vehicles.

**Metro & Underground Railways and Stations** require powered ventilation to provide climate control as well as to serve as smoke control in case of fire.

**Tunnel Construction/Mining** requires powered ventilation for the safety and comfort of the workers in the tunnel/mine.

**Car Parks** require powered ventilation to remove the carbon monoxide created by vehicle emissions. They can also be utilized for smoke control in the event of a fire.

**Aircraft Hangers** require power ventilation to assist in the removal of exhaust fumes created during routine maintenance of aircraft engines. These units can also be utilized to control smoke in the event of a fire emergency.

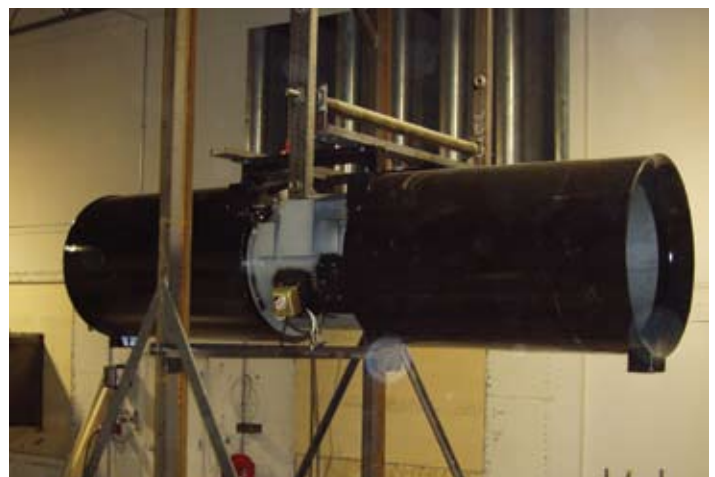
All of the applications have their own specific set of national and international standards. The customers also have a unique set of specifications that vary from contract to contract. With its many years of experience, Clarage can proudly service all of these needs.



This is one of the twenty-three 316L stainless steel centrifugal fans installed in the Queens Mid-Town Tunnel in New York.



Partial shipment for the LA Metro contract that included eight 2M central fans and eight 1.25M jet fans.



Thrust tested in accordance with AMCA 250 for the Minneapolis Airport Project.

## FACTORS AFFECTING SYSTEM DESIGN & FAN SELECTION

- Temperature ratings and smoke control
- Ventilation requirements
- Tunnel length
- Tunnel ceiling height
- Installation and operation costs
- Traffic flow (one or two way)
- Density of ambient air
- Required sound levels
- Wind velocity at portal of tunnel
- Portal location with respect to tunnel depth and sea level
- Air volume and thrust requirements
- Friction losses due to tunnel construction
- Real estate limitation – overall size of mechanical room
- Requirement for directional control of air flow



These axial units were designed, built and shipped for a job at the Dulles Airport.



Fans and transitions being loaded for shipment to Seattle for the Link Light Rail.



One of three truly reversible NYCT fans shipped for the E-31275 contract at West 30th and 6th Avenue.



LA Metro jet fan in the AMCA 250 test rig.