

# ***Multi-Cyclone Dust Collectors***



**Clarage**

*Custom, Tough and Proven*

# CLARAGE MULTI-CYCLONE MECHANICAL COLLECTORS

## Clarage

Half a Century of  
Design and Experience

Designed and Fabricated  
to Meet Customer Needs

Experience makes the difference. Clarage has been in business since 1874, dedicated to the design and fabrication of fans since 1912 and mechanical multi-cyclone dust collectors since 1940. When Clarage collectors were first introduced, it was under the name of the Fly Ash Arrestor Corporation. In the late 1960's, the name changed to Zurn Air Systems Division, and in 1997 our current name, Clarage was introduced. Although the name has changed, Clarage still manufactures mechanical collector equipment that has established one of the best known and widely respected reputations in the world.

There are thousands of Clarage collectors installed in the United States and around the world. Clarage's experience, capability, and extensive installation list has been built up over decades of dedication and resourcefulness.

Practical uses for Clarage collectors range from helping a system meet its required air quality emission levels, to extending the life of the system ID Fan and connecting ductwork. Specific applications Clarage has supplied collectors for include:

- Oil
- Rockwool
- Bagasse
- Lime dust
- Glass beads
- Sludge
- Coke calciner
- Sulfur dust
- Sinter dust
- Feldspar
- Clinker cooler dust
- Iron ore pellets/dust
- Kalor dust
- Rice hulls
- Petroleum coke
- Sulfite
- Wood waste/bark (various types)
- Coal (various types)
- Miscellaneous refuse

Unmatched experience along with flexible engineering and the capability of altering conventional designs to meet specific customer needs, makes Clarage the best choice for mechanical collectors.



# Clarage Collectors

## THE MULTI-CYCLONE MECHANICAL COLLECTOR

A collector consists of a housing containing a quantity of collecting tube assemblies, each an individual centrifugal dust collector. As illustrated, dust laden gas enters the top of the collecting tube through the inlet guide vanes. These vanes impart a smooth, fast spiral to the gas, setting up a highly centrifugal action with a minimum of turbulence and erosion.

As the gas descends in a cyclonic pattern, the dust is forced by centrifugal action against the wall of the collecting tube and gravitates to the bottom where it is discharged through the dust discharge boot. A vortex forms at the bottom of the collecting tube and the cleaned gas makes an inner whirl up into the outlet tube. Optional outlet recovery vanes help straighten the gas flow to reduce draft loss.

Careful attention to housing design details such as inlet and outlet proportions, collecting tube spacing, and dust discharge boot design assures uniform gas distribution and proper flow to each individual collecting tube for maximum design efficiency.

## TUBE DIAMETERS AND EFFICIENCY

Clarage collectors are available with 6", 9" and 11.5" diameter collection tubes. Theoretically, high-collection efficiencies are achieved with the smaller 6" or 9" diameter tubes, since

the centrifugal force applied to the dust particles increases as the tube diameter decreases. Three other major design factors also significantly affect collection efficiency, namely proper gas distribution, draft loss, and particle size/specific gravity. Clarage engineering is available for assistance in determining tube size.

## STANDARD (STD) AND TOTALLY ACCESSIBLE (TA) MECHANICAL COLLECTORS

Clarage collectors are designed and fabricated to meet the customers needs. The two types available are Standard (STD) and Totally Accessible (TA).

The collecting tube assemblies for both the STD and the TA collectors are identical. The differences between the STD and the TA collector are in the design of the housings and outlet tubes.



Operation of collecting tube assembly.

## STANDARD DESIGN COLLECTOR



The STD design collector is most commonly used in smaller industrial applications. The greatest advantage of the STD collector is its compact design that can easily accommodate space limitations. Additional advantages of the STD collector design can be realized through cost reduction in insulation and lagging area, as well as a smaller support structure.

### **Standard Design Collector**

...when space is a premium.

### **Totally Accessible Design Collector**

...when total access is required.

#### **STANDARD COLLECTOR FEATURES:**

##### **Available in Three Tube Sizes**

Collecting tubes in 6", 9" and 11.5" diameters available to meet individual requirements.

##### **Heavy-Duty Construction**

All components are designed for rugged service by an experienced collector team totally familiar with collector operation. Each application is individually evaluated based on the severity of service and previous field experience.

##### **Completely Shop-Assembled**

All collectors are custom-fabricated and completely assembled to the extent practical for shipment. This results in minimum erection man-hours and handling at the installation site.

##### **Cast Collecting Tubes**

Special cast tubes give uniform wall thickness and maximum Brinell hardness for prolonged service-life.

The mounting flange at the top of the collecting tube is an integral part of the casting. Four studs provide secure, gas-tight mounting.

##### **Replaceable Dust Discharge Boots**

Sturdy cast iron boots are at the base of the collecting tubes where the greatest wear occurs. Each boot bolts in place for quick, economical replacement compared to more costly tube designs which utilize an integral tube bottom.

##### **Access Doors**

This feature is constructed of heavy duty cast iron with quick open design, that requires no special tools to open. These doors can be located in any direction. Special configuration such as our "Double-Doors" can be incorporated at the customers request.

Warning signs and safety chains are always standard components of Clarage Collector Access Doors.

# Clarage Collectors

## TOTALLY ACCESSIBLE DESIGN COLLECTOR

The TA collector offers three basic differences to conventional standard collector designs. These result in significant improvements in collector wear-resistance and maintenance. These differences are:

- Grouped collecting tubes with inlet access corridors
- Separate outlet plenums for tube groupings
- Equal length outlet tubes

The inlet access is such that every tube is within easy reach and view. Normal design provides that no tube is more than one tube away from the access corridor, making it totally accessible.



### TOTALLY ACCESSIBLE COLLECTOR FEATURES:

Totally Accessible Collectors have all of the features of the Standard Collector, and the following additional features:

#### **Totally Accessible**

The accessibility is available through access doors provided at both inlet and outlet locations for inspection, cleaning and maintenance as required.

#### **Lower Velocities**

Lower velocities significantly reduce the wear of the tube assembly components. Entering gases/particulate utilize the access corridors, therefore do not cause abrasion while passing through the array of gas outlet tubes, which is common to conventional collectors.

#### **Flexible Arrangement**

TA collectors, with no inlet static pressure differential, make long and

narrow arrangements possible for substantial duct savings. The unique TA design also allows flexibility in inlet and outlet arrangements.

#### **Elimination of Hopper Recirculation**

The TA collector does not have differential pressure in the hopper, thereby eliminating the problem of hopper recirculation.

#### **Balance Flow To All Tubes**

The plenum hooded design eliminates obstruction in the gas stream as the gas travels through the collector assembly. This non-obstructive feature allows for no inlet static pressure differential, and provides low-velocity/low-pressure drop gas flow to every tube.

### OPTIONAL STD AND TA DESIGN FEATURES

Hopper Evacuation Systems

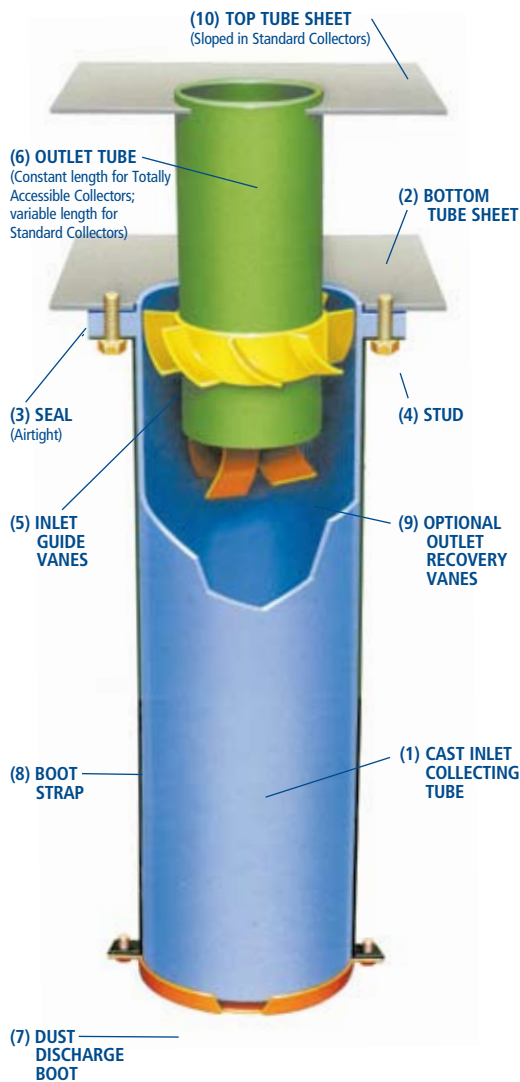
Inlet/Outlet Arrangements

Damper Control for Increased Collector Flexibility

- Sectionalizing
- By-Pass
- Isolation

## Clarage

### Cut-away View of the Inlet Tube Assembly



## YOUR SINGLE SOURCE FOR ALL COLLECTOR REPLACEMENT PARTS

Clarage's expertise certainly does not end with the design and fabrication of our own collectors. One Clarage's greatest strengths has been, and continues to be, the ability to repair, modify, or replace other manufacturer's collectors. Replacing obsolete equipment produced by companies like Western, Joy, UOP, etc. is routine and common practice at Clarage. Engineering flexibility, in most cases, allows Clarage to match existing collector dimensions exactly. This results in lower replacement costs, through fewer modifications to the surrounding structures.

Even when only replacement tubes are required, Clarage is the logical choice. Most competitor tube assembly designs (obsolete and current), can be easily substituted with one of Clarage's available tube sizes. Over the years, the 9" inlet tube has become the most universally used tube size for Mechanical Collectors. Clarage offers this size, and is able to adapt it to any collector design which uses the 9" tube. This ability, along with an always adequately stocked supply of collector parts, makes Clarage the best choice.

Whether it's a single part or the entire unit, Clarage has your mechanical collector replacement part needs covered.

### CAST INLET COLLECTING TUBES WITH INTEGRAL MOUNTING FLANGE

Clarage collecting tubes (1) are constructed of cast iron with an alloy additive to yield a higher Brinell hardness.

A mounting flange is cast at the top of the collecting tube, which holds the entire assembly to the bottom tube sheet (2). A permanent airtight seal (high temp. gasket) (3) is required to prevent gas from escaping around the tube directly into the hopper. A 3/8-inch lip extends above the integral flange to extend through the tube sheet into the inlet. The flange is sealed to the tube sheet with four studs (4) to retain the initial tight-seal even under severe service.

# Clarage Collectors

## INLET GUIDE VANES

The inlet guide vanes (5) are separately cast and are held in place by support on the gas outlet tube (6). They fit securely in place inside the collecting tube keeping the outlet tube centered. Inlet guide vanes are designed to give the gas maximum centrifugal action on its spiraling path down the tube toward the dust discharge boot (7). Inlet guide vanes are replaceable by splitting them in half. Each vane has two notches for this purpose.

## DUST DISCHARGE BOOT

The cast-iron dust discharge boot is retained at the lower end of the collecting tube by two boot straps (8). The boot straps in turn are bolted in place at the top of the collecting tube with two of the studs used to connect the assembly to the bottom tube sheets. Since the boot is subject to the greatest wear, it has been designed for easy replacement. This design allows greater cost savings than replacement of the entire collecting tube, as with competitive designs having the boot and tube as an integral assembly. The dust discharge boot has three peripheral slots where collected dust is discharged by inertial and centrifugal force out of the tube, immediately prior to the vortex

reversal of the gas at the tube bottom.

## OUTLET RECOVERY VANES

Recovery vanes (9) are used at the lower end of the gas outlet tube in certain applications. These vanes are used to recover the rotational energy of the exiting gas, thereby increasing the total capacity of each collecting tube. Recovery vanes are not recommended where the incoming gas has a characteristic, such as heavy oil or bark-fired combinations. Outlet recovery vanes have the efficiency benefits of permitting a smaller collector for a given gas flow.

## OUTLET TUBES

Outlet tubes are held in place at the lower end by the inlet guide vane and welded at the top to the top tube sheet (10). Their purpose is to deliver the cleaned gas from the collecting tubes to the outlet chamber. The abrasive gases on the outside of these tubes cause greater wear than from the inside. Both steel and high-Brinell cast outlet tubes are available.

The unique design of the discharge boot means low cost replacement with improved operating efficiency.

Example of "STD" Type collector modified to incorporate "TA" Type structural supports, and angle iron wear shields on the front row of outlet tubes.



# Clarage

## PRODUCTS AND SERVICES

### STANDARD CENTRIFUGAL FANS

Backward Curved  
Backward Inclined  
Pressure Blower  
Industrial Exhauster — Radial/  
Paddle Wheel  
Cast Iron Exhauster

### CUSTOM CENTRIFUGAL FANS

Airfoil  
Backward Curved  
Backward Inclined  
Radial Tip  
Straight Radial  
Forward Curved  
Hi-Boost — 2-Stage  
Pressure Blowers  
All Drive Arrangements  
SWSI and DWDI Selections  
Inlet Boxes  
Sleeve or Anti-friction Bearings  
Volume Control Dampers  
High Temperature Fans  
Special Materials

### AXIAL FANS

Jet Fans  
Tubeaxial  
Vaneaxial  
Fixed Pitch  
Adjustable Pitch — In Motion  
Adjustable Pitch — At Rest

### MULTI-CYCLONE DUST COLLECTORS

6", 9" and 11.5" Tube  
Availability  
Standard (STD) and Totally (TA)  
Accessible Designs

### SERVICES

Repair and Rebuild  
Field Service  
Upgrade Engineering

- Performance
- Material Construction

Quality Fabrication  
Erection and Start-up  
Supervision  
Testing Services  
Turnkey Services

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