

## CHEVRON ENTRAINMENT SEPARATORS

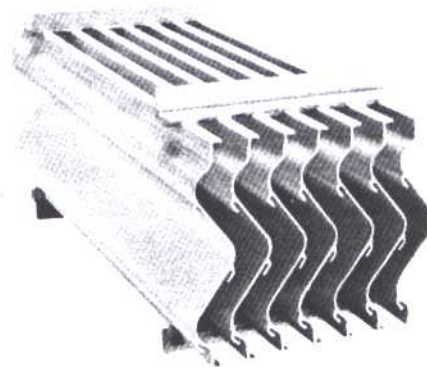
Ceilcote Air Pollution Control chevron type entrainment separators are designed to provide high performance in the removal of liquid entrainment from gas streams in scrubbers, air washers, gas absorbers, ventilation systems, and cooling towers. The unique design results in higher removal efficiencies than previously obtained. A continuing research and development program enables Ceilcote Air Pollution Control to provide the latest in technical backup data to assure continued optimum performance.

Modular designed units will accommodate a wide variety of vessel cross sections including round, rectangular, and irregular shapes for maximum utilization of a vessel's cross sectional area. A wide range of module sizes are available to meet specific application requirements.

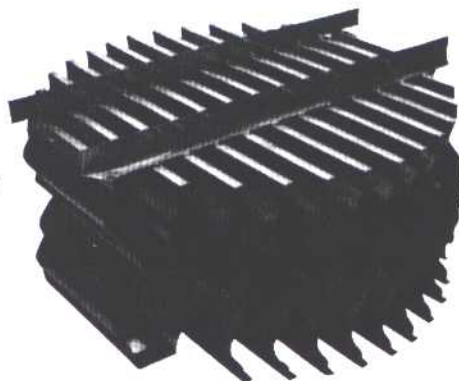
Installation costs are low and units seldom require maintenance. Ceilcote Air Pollution Control chevron type entrainment separators are highly corrosion resistant and can withstand a wide range of temperatures depending upon material of construction. Outstanding physical and chemical properties make these units ideal for entrainment separation in a wide range of industrial and commercial installations.

Typical installations are in flue gas desulfurization for electric utilities, electroplating, metal finishing, and in the petroleum, petrochemical, chemical, and fertilizer industries.

*Fiberglass reinforced plastic (FRP) chevron-type mist eliminator*



*Stainless steel 4-bend chevron-type mist eliminator*



*Noryl® 4-bend mist eliminator*



## Theory

The Ceilcote Air Pollution Control chevron type entrainment separator works on the principle of direct impaction and centrifugal forces as illustrated in Figure 1. The first liquid collection trough (Point A) on each blade is critically located to remove the majority of entrained moisture droplets and to minimize pressure drop. Entrained droplets passing by the first collection trough are impacted on the adjacent blade upstream of the second collection trough (Point B). After impaction, the droplets remain on the surface of the blade as there are insufficient velocity and energy to re-entrain the droplets into the airstream. In a similar manner, any droplets small enough to have bypassed the first and second collection trough will be collected on the third trough (Point C). This third trough increases the overall reliability and collection efficiency of the system.

In vertical gas flow installations all the collected liquid flows by gravity on the surface to the gas inlet of the blades and then forms droplets which fall back into the tower. In horizontal gas flow installations the collected liquid flows into the collection trough and drains by gravity.

## FEATURES

### Materials

Ceilcote Air Pollution Control 4-bend chevron type entrainment separators are available in a wide range of materials including Noryl<sup>®</sup>, fiberglass reinforced plastic (FRP), and various metal alloys. These materials offer optimum resistance for a wide range of chemical environments and service conditions.

Lightweight fabrication from Noryl<sup>®</sup>, a thermoplastic material with excellent physical and chemical properties, offers an easy to handle lightweight module which retains a high degree of rigidity and strength to a maximum service temperature of 180°F.

<sup>1</sup> Noryl<sup>®</sup> is a trademark of General Electric Company.

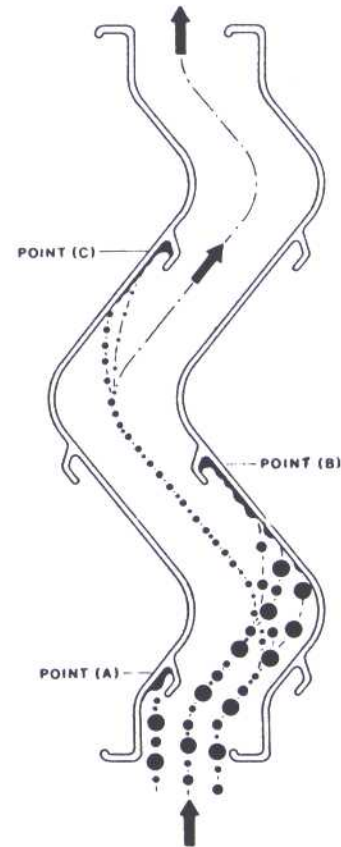


FIGURE 1

Fiberglass reinforced plastic (FRP) pultruded blades use no carbonate fillers and incorporate a synthetic surface veil on all exterior surfaces. FRP offers excellent corrosion resistance to a maximum service temperature of 225°F. Brief excursions above 225°F are permissible. Please consult us for specific recommendations.

Various grades of stainless steel such as 304 and 316 are available where high temperatures can be a problem or specific operating conditions dictate the use of an alloy material.

### Construction

All Ceilcote Air Pollution Control thermoplastic and FRP chevron type entrainment separator blade assemblies incorporate an improved bonded method of construction. A notched structural angle, assuring exact blade spacing, is bonded to the entrainment separator blades at required intervals to form a modular assembly with excellent structural integrity.

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## Engineering

Ceilcote Air Pollution Control has a professional staff to assist in the engineering and design of a solution to your entrainment separation problem including a complete system consisting of the housings, spray flush headers, piping, and ductwork.

## Ease of Maintenance

All materials of construction have smooth surfaces that tend to minimize solids buildup. Standard blade space of  $1\frac{3}{8}$ " affords excellent penetration for flush sprays where they are required. No other chevron type blade provides these features without a significant reduction in liquid entrainment removal efficiency.

## Research & Development

Ceilcote Air Pollution Control has a continuing research and development program to evaluate blade profiles in different environments and applications. This research assures you that we can supply a cost effective entrainment separator system to solve your specific problem.

## SPECIFICATIONS

### Typical Blade Specification

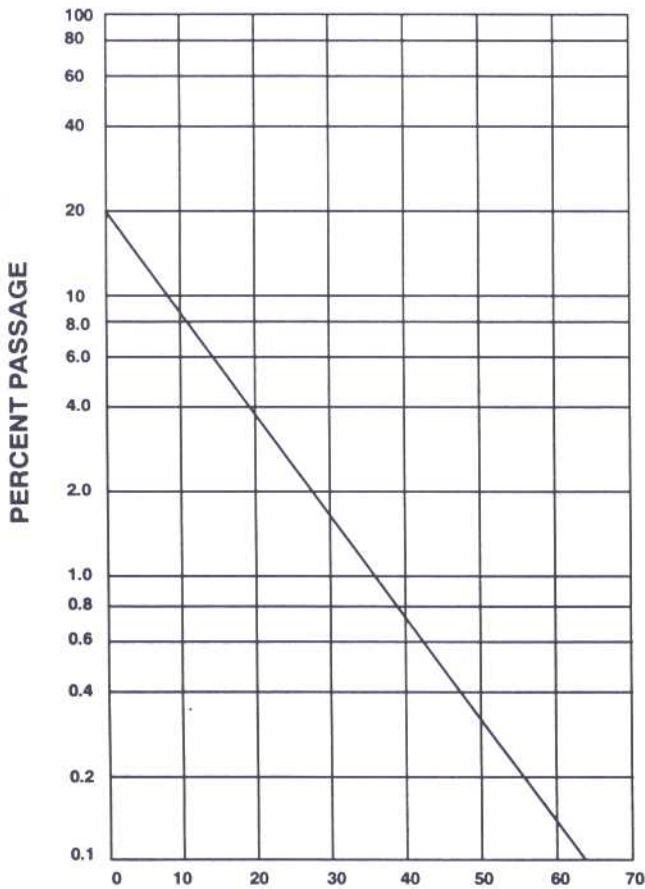
1. Ceilcote Air Pollution Control chevron type entrainment separator blades will be of continuous profile with smooth changes in gas flow. There will be three (3) water collection troughs located on alternating surfaces running the continuous length of the blades.
2. Assembled units will have a nominal depth of  $10\frac{1}{2}$ ".
3. Material of construction shall be Noryl®/FRP/Stainless Steel alloy.
4. All FRP cut edges shall be coated with a pigmented resin.

5. All fiberglass reinforced plastic (FRP) blades shall be vinylester resin. 100% of all exterior surfaces shall be covered by Nexus surface veil for maximum corrosion protection.
6. All non-metallic assemblies shall be of bonded construction.
7. Metal blades shall utilize spot welding.
8. Certification documents will be required to assure proper materials were used.

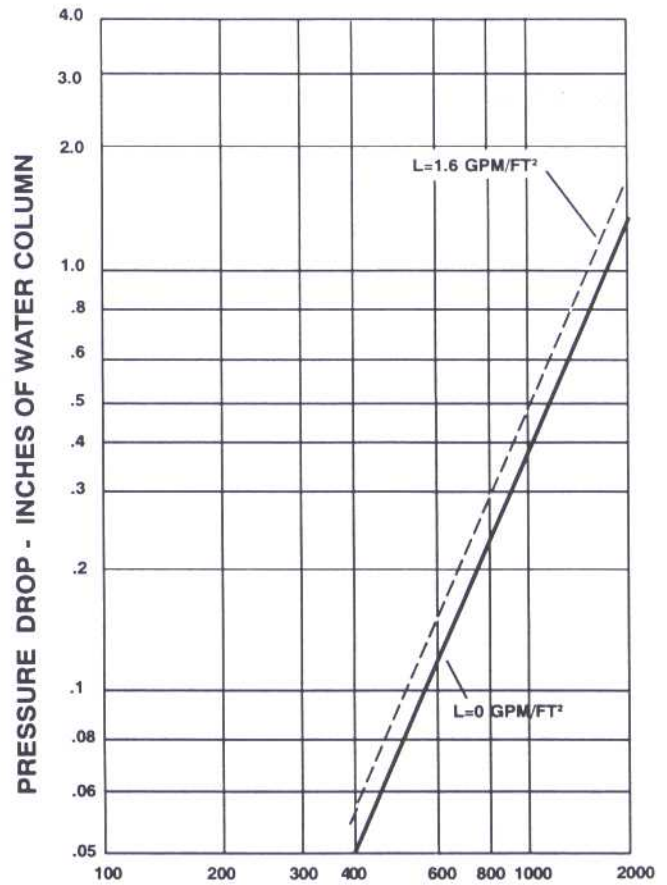
## PERFORMANCE

The Ceilcote Air Pollution Control chevron type entrainment separator optimizes moisture removal and pressure drop in order to provide the most economical system. Figure A on page 4 shows moisture removal characteristics. This data was generated by an independent testing laboratory using photomicrographic techniques. The testing equipment utilizes a chamber with a cross sectional area of 16 square feet. This large area eliminates errors due to wall effects that exist on smaller test units.

A modification of the photomicrographic optic system permits generation of data on droplets as small as 10 microns. Removal efficiencies exceed 99.99% over a range of 400 to 1300 feet per minute gas velocity in a horizontal gas flow configuration and 400 to 1000 feet per minute gas velocity in a vertical configuration. Figure B illustrates the pressure drop characteristics for the Ceilcote Air Pollution Control 4-bend chevron type blade at no liquid loading and at a 1.6 GPM/ft<sup>2</sup> liquid loading.



**FIGURE A**  
Droplet Diameter in Microns  
Removal Efficiency Velocity 725 FPM



**FIGURE B**  
Air Rate - Ft./Min.  
Air Rate vs. Pressure Drop

## PHYSICAL DATA

### TYPICAL PROPERTIES

Material	Depth of Assembly Including Structural Angles	Maximum Spacer Separation		Temperature Limit	Maximum Unsupported Span	Weight per Sq. Ft.
		Low Velocity	High Velocity			
Noryl® Eng	10 1/2"	3'	2 1/2'	180°	6'-7"	4.5#
FRP	10 1/2"	3'	2 1/2'	225°	8'-10"	10.0#
316 S.S.	10 1/2"	3'	2 1/2'	-	8'	14.5#



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