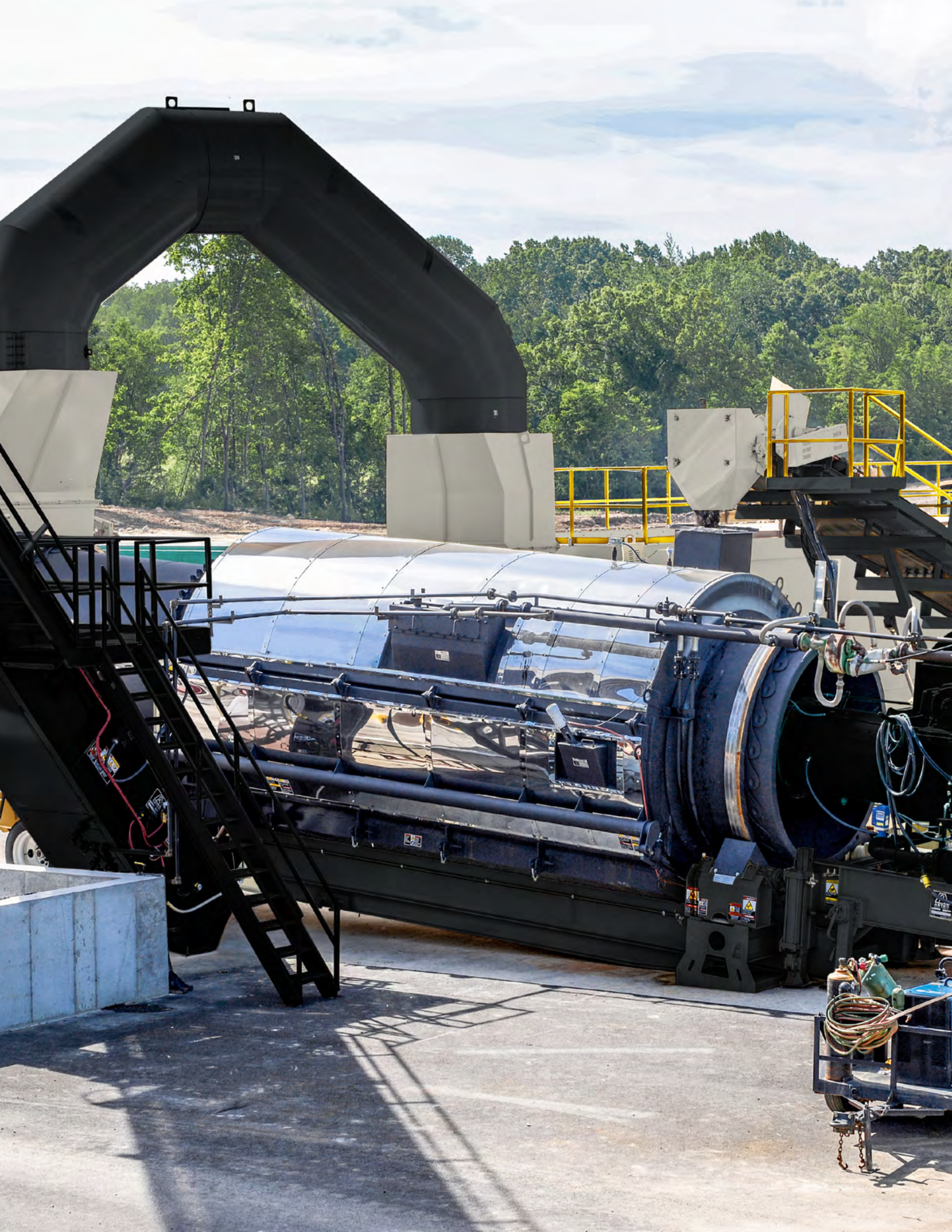


# DOUBLE BARREL<sup>®</sup> SERIES ASPHALT DRYER/MIXER









# ASTECC

## DOUBLE BARREL®

### Dryer/Drum Mixer

Astec brings you the Double Barrel dryer/drum mixer, the mixer of choice over any other. The Double Barrel dryer/drum mixer combines the latest in hot and warm mix technology with other great Astec features. Get guaranteed productivity and top quality mixes, while keeping operating costs per ton of mix low and meeting the most stringent environmental codes. Relocatable and portable versions all perform to the same high standards.

## Double Barrel® RELOCATABLE

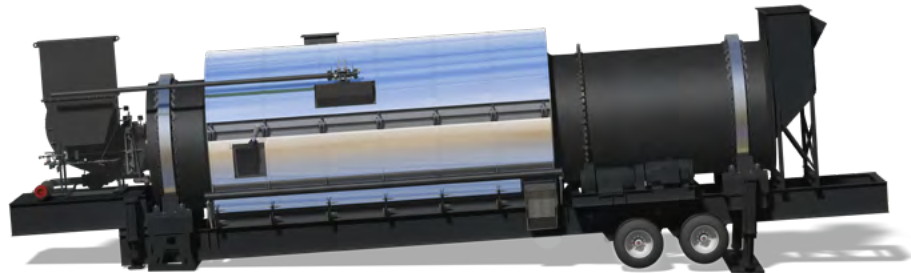
Up to 50% RAP



DRUM SIZE	MIXING CHAMBER	TPH (MTPH)
6' x 33' (1.8m x 10m)	19' (5.8m)	200 (181 MTPH)
7' x 38' (2.1m x 11.6m)	22' (6.7m)	300 (272 MTPH)
8' x 41' (2.4m x 12.2)	22.5' (6.9m)	400 (363 MTPH)
9' x 47' (2.7m x 14.3m)	22.5' (6.9m)	500 (454 MTPH)
10' x 50' (3m x 15.2m)	22.5' (6.9m)	600 (544 MTPH)

## Double Barrel® PORTABLE

Up to 50% RAP



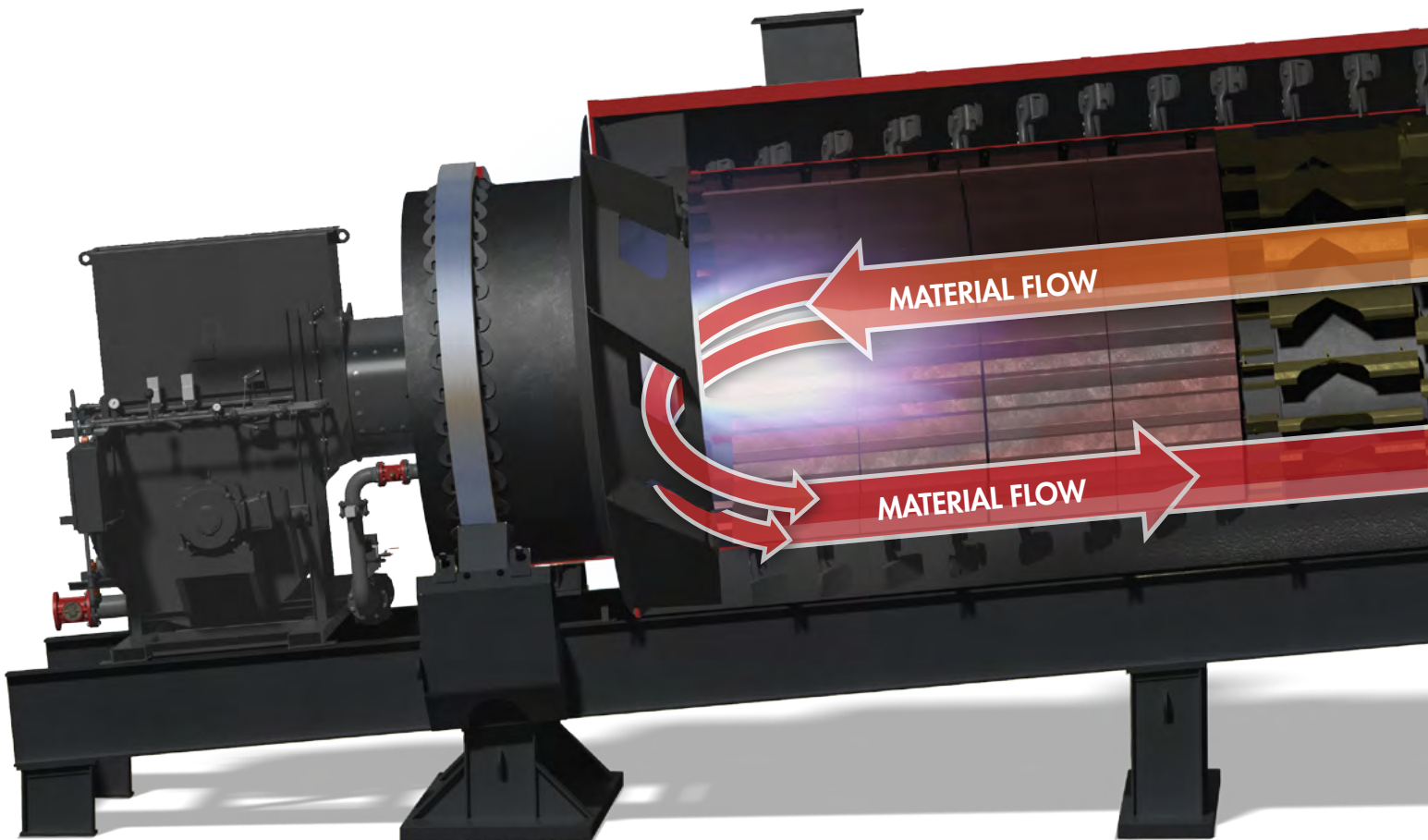
DRUM SIZE	MIXING CHAMBER	TPH (MTPH)
6' x 33' (1.8m x 10m)	19' (5.8m)	200 (181 MTPH)
7' x 37' (2.1m x 11m)	19' (5.8m)	300 (272 MTPH)
8' x 38' (2.4m x 11.6m)	21' (6.4m)	400 (363 MTPH)

# Double Barrel

## MATERIAL FLOW

As aggregate enters the drum from the conveyor, it passes through the flop gate, which minimizes air leakage into the drum. From there, it passes through a series of veiling flights that transfer the heat from the burner to the aggregate. The aggregate then exits the inner drum, dropping down into the outer drum shell, where paddles sequentially mix in RAP, liquid AC, and dust/filler in a flame free environment. In this zone, the constituents are mixed for the remainder of the drum length before exiting to the drag.

Aggregate Entry





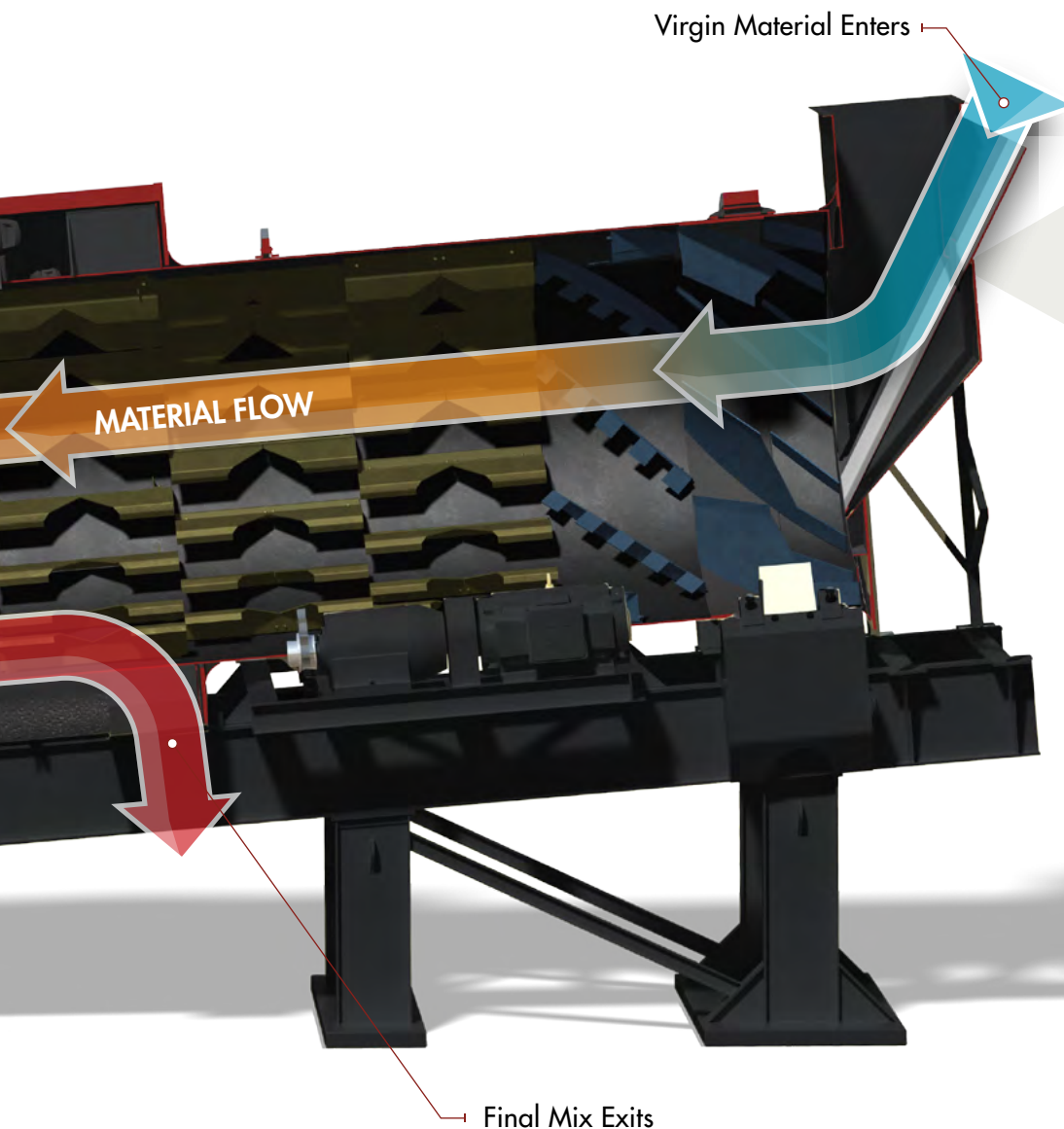
Recycle Entry



Baghouse Dust Entry



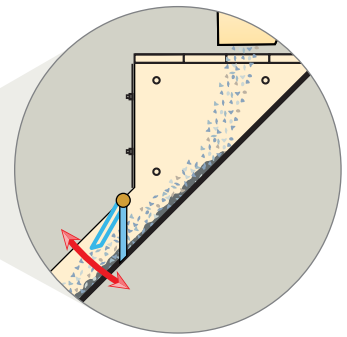
Final Mix Exit



Virgin Material Enters

MATERIAL FLOW

Final Mix Exits



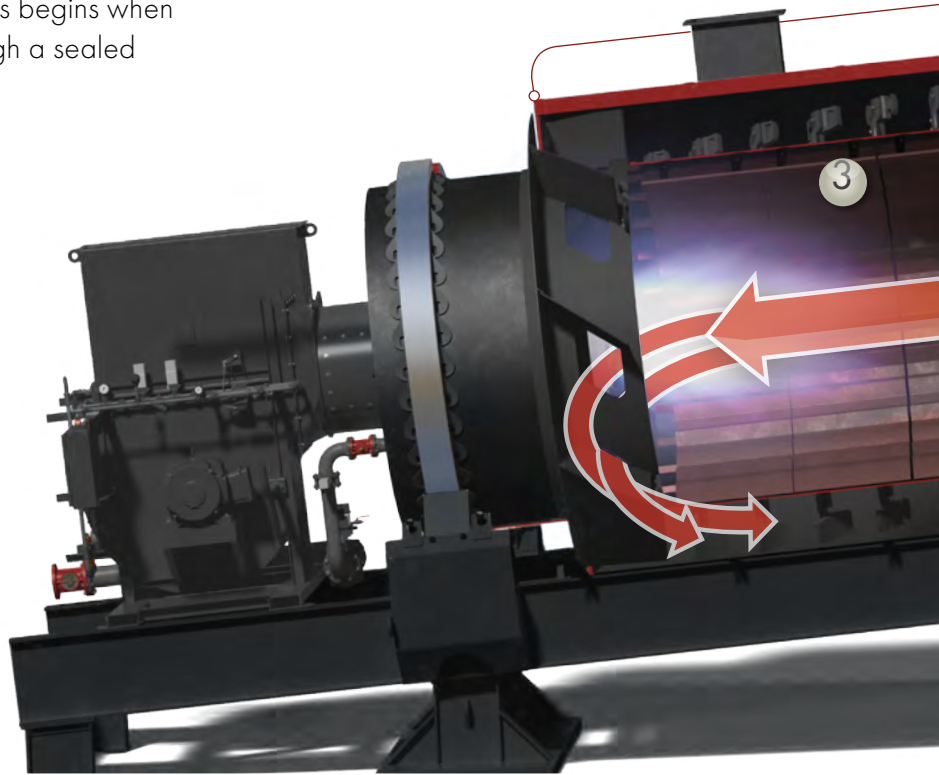
### INLET FEED CHUTE

- The 66° gravity inlet chute is lined with ceramic tiles to minimize wear to the chute.
- A sealed flap gate minimizes air leaking into the baghouse. Minimizing air leakage is important, because excessive air leakage will result in decreased production.
- Slinger feeder also available.

# Double Barrel

## DRYING (INNER DRUM)

The Astec Double Barrel dryer/drum mixer is designed to move aggregate through the mix process with maximum efficiency. Drying of the virgin aggregate is the first step in the process and takes place in the inner drum. The drying process begins when the virgin aggregate enters the inner drum through a sealed gravity chute. The flop gate restricts air entry into the drum while allowing the aggregate to pass through. The angle of the ceramic-lined inlet chute keeps material flowing freely into the drum. State-of-the-art flights move the material through the drying zones. Once dried and heated, the aggregate leaves the drum through exit openings and enters the outer mixing chamber.

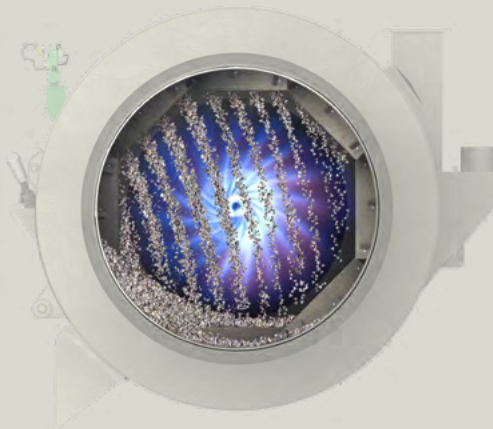


1

### CONDITIONING FLIGHTS

**Break up any clumps or sticky material when the aggregate first enters drum.**

Fine material has a tendency to clump together in clusters when wet, particularly in the presence of clays. The conditioning flights break up these clumps to ensure all particles will shower evenly.



2

### V-FLIGHTS

**Provide greater uniformity of the aggregate veil through the gas stream during the drying process, across a wide variety of mix designs and tonnage rates.**

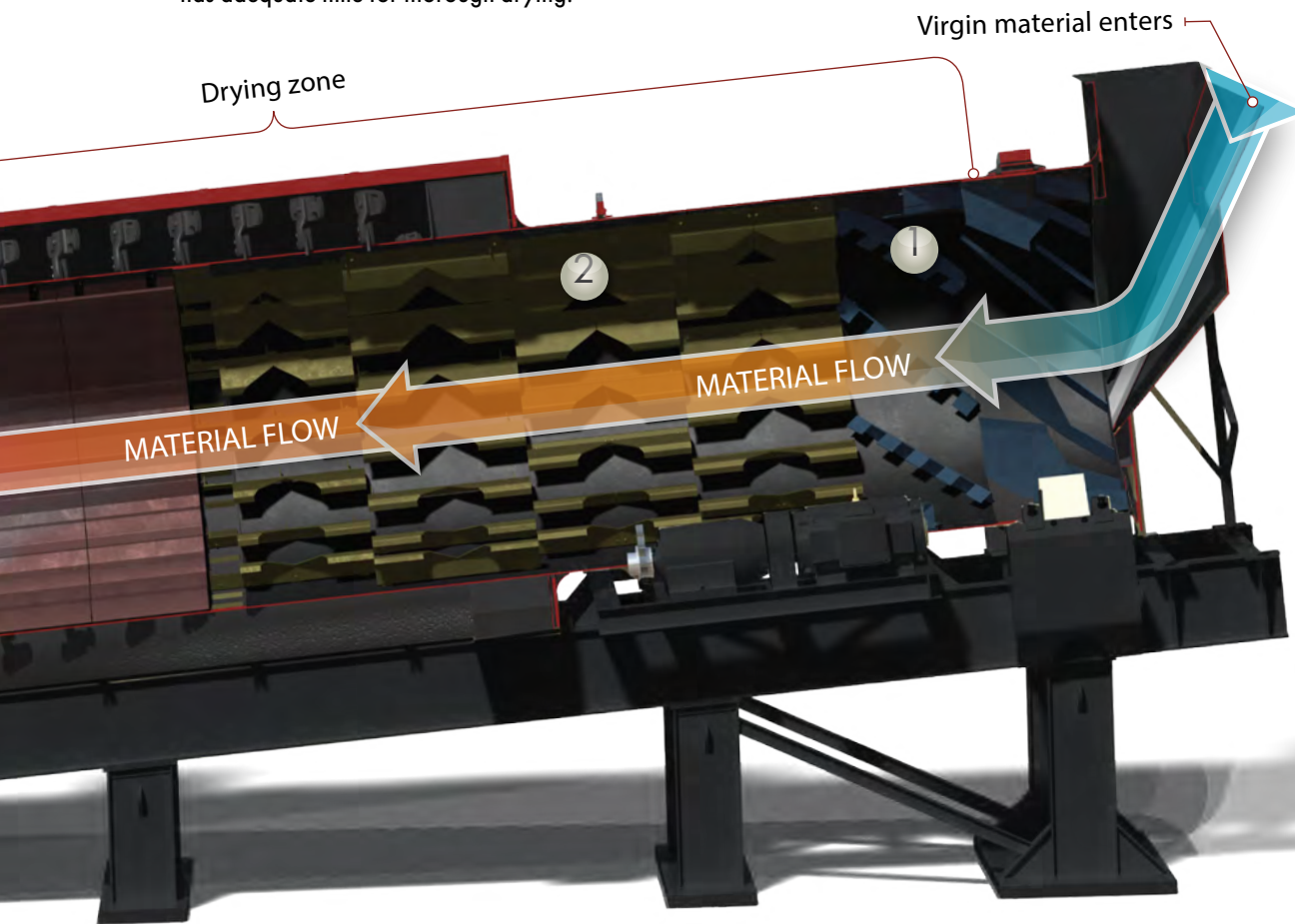
The v-shaped notch in the flights allows material to start pouring out of the flight at the beginning of revolution. The material in the bucket continues to pour out until the rotation is complete. This is what provides the even veil of material. The v-flight is also larger than the standard flight, allowing it to carry the same amount of aggregate even with the notch.

U.S. Patent No. 9,835,374



## LONGER DRYING CHAMBER

The Double Barrel dryer/drum mixer features the industry's longest drying chamber. The entire length of the drum is used for drying virgin aggregate. The long drying chamber assures that the virgin aggregate has adequate time for thorough drying.

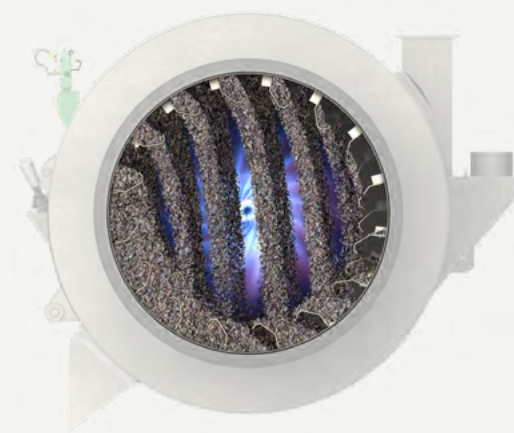


3

## COMBUSTION FLIGHTS

***Prevent aggregate from impinging on the flame while spreading the material to maximize radiant heat transfer.***

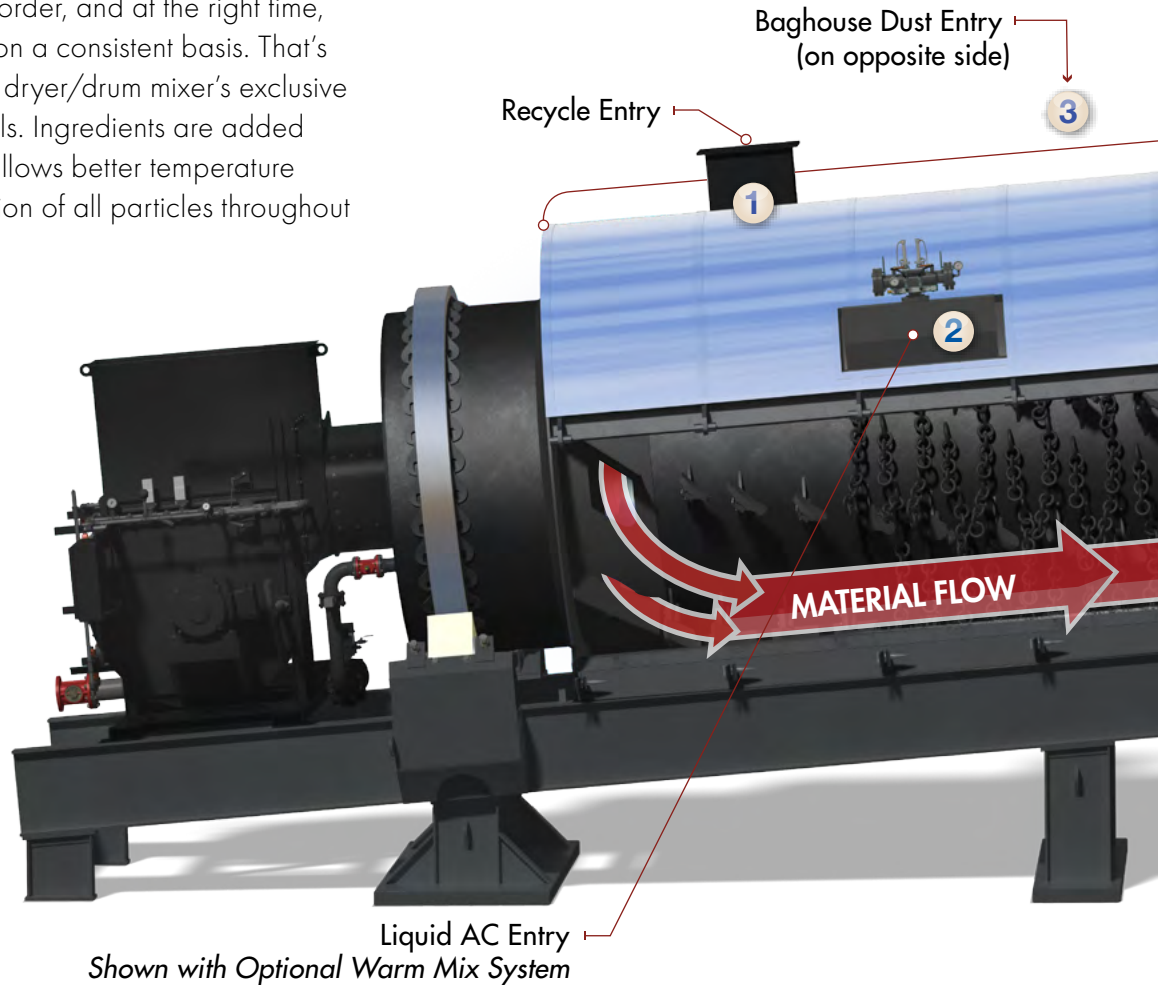
The combustion flights are made of stainless steel, which lasts much longer than traditional carbon steel. The flights overlap one another, creating a shield that minimizes the radiant heat that hits the drum shell to keep it from overheating.



# Double Barrel

## MIXING (OUTER DRUM)

Adding materials in sequential order, and at the right time, is the key to making good mix on a consistent basis. That's where the Astec Double Barrel dryer/drum mixer's exclusive sequential mixing process excels. Ingredients are added to the mixture in an order that allows better temperature equalization and even distribution of all particles throughout the mix.

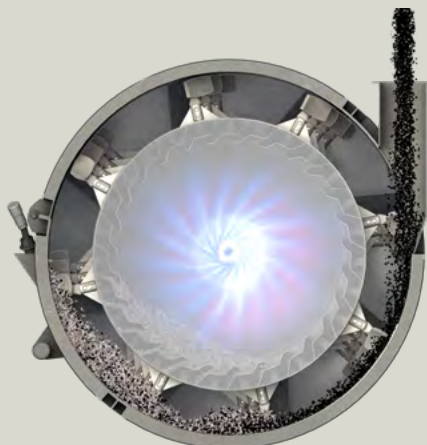


### 1 STEP ONE SEQUENTIAL MIXING

#### RECYCLE ENTRY

**RAP (Recycled Asphalt Pavement) material is added to the aggregate in the mixing chamber.**

First in the mixing sequence, recycle enters into the mixing chamber through the recycle inlet. Recycle, which may be RAP, roofing shingles, crumb rubber, or a mixture thereof, is heated by contact with the hot virgin aggregate.



### 2 STEP TWO SEQUENTIAL MIXING

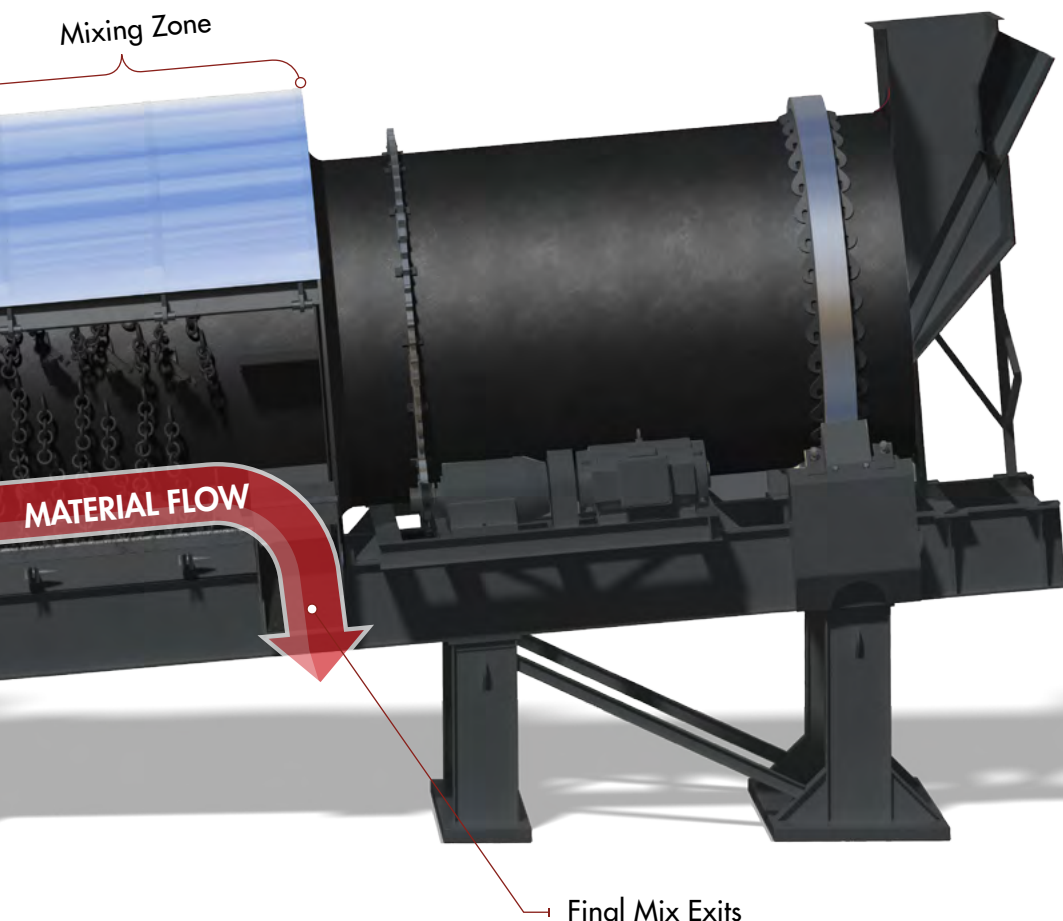
#### LIQUID ASPHALT ENTRY

**Liquid asphalt is injected into the mixing chamber through the AC inlet or optional Warm Mix System.**

At the point where virgin and recycled materials are at the proper temperature and thoroughly mixed, liquid asphalt cement (AC) is injected into the mixing chamber. As the mix moves through the mixing chamber, it is continually stirred by mixing paddles.



Sequential mixing ensures ingredients are added to the hot mixture in an order that allows better temperature equalization and even distribution of all particles throughout the mix.



### LONGER MIXING CHAMBER

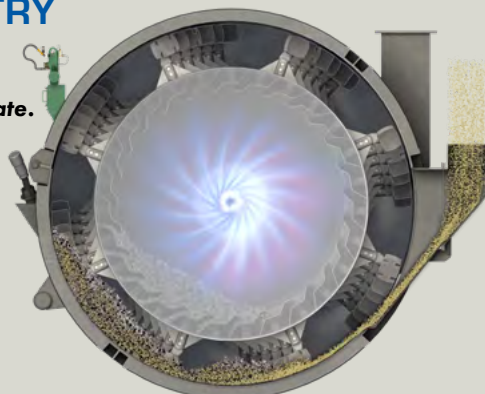
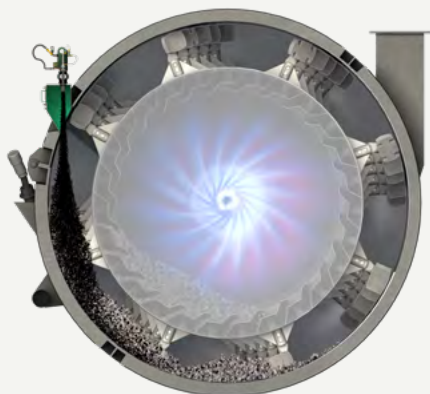
Astec's extraordinarily long mixing chamber allows long mixing times. Long mixing times, together with Astec's sequential mixing, ensure uniform and consistent incorporation of all mix materials.

## 3 STEP THREE SEQUENTIAL MIXING

### BAGHOUSE DUST ENTRY

*Baghouse fines are added last, so they do not absorb the liquid AC before it is distributed on the aggregate.*

Finally, baghouse fines and other additives enter the mixing chamber and become embedded in the thick layer of asphalt coating the rock. Astec's sequential mixing keeps fines from soaking up more than their share of AC, because the AC has been well distributed before fines are added.













# Gas Flow

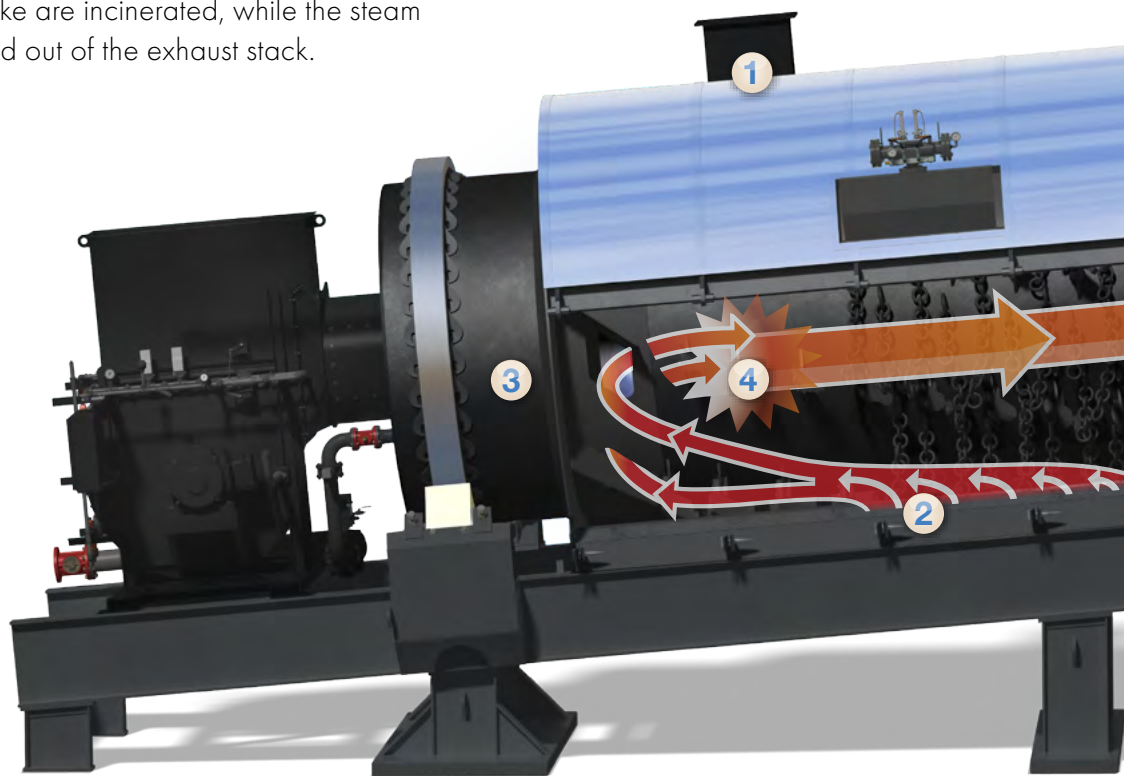
## HYDROCARBONS AND STEAM

There is a continuous release of steam as the RAP is introduced and heated. This is one of the keys to the success of the Double Barrel dryer/drum mixer as a processor of RAP – steam blankets the superheated virgin aggregate and RAP, displacing oxygen. As a result there is less oxidation of the mix.

As the RAP dries, blue smoke emissions can also be produced along with steam.

Steam and blue smoke are pulled into the burner flame by the baghouse fan.

The hydrocarbons in the blue smoke are incinerated, while the steam simply passes to the baghouse and out of the exhaust stack.



1 RAP enters drum

2 Heated virgin aggregate and RAP generate steam and blue smoke

3 Steam and hydrocarbons are pulled into the flame



### PULSE JET BAGHOUSE

Pulse jet baghouses remove particulates from the exhaust stream to efficiencies greater than 99.95%<sup>†</sup>, and typically lower emissions to less than one quarter of EPA standards. During the cleaning mode, blowpipes direct bursts of compressed air into two rows of bags at a time. The shock and momentary back-flow produced by the compressed air pulse causes the bags in the section to expand and expel the collected dust cake from the surface, allowing it to drop into the hopper.

<sup>†</sup>Emission performance is typical, but not guaranteed





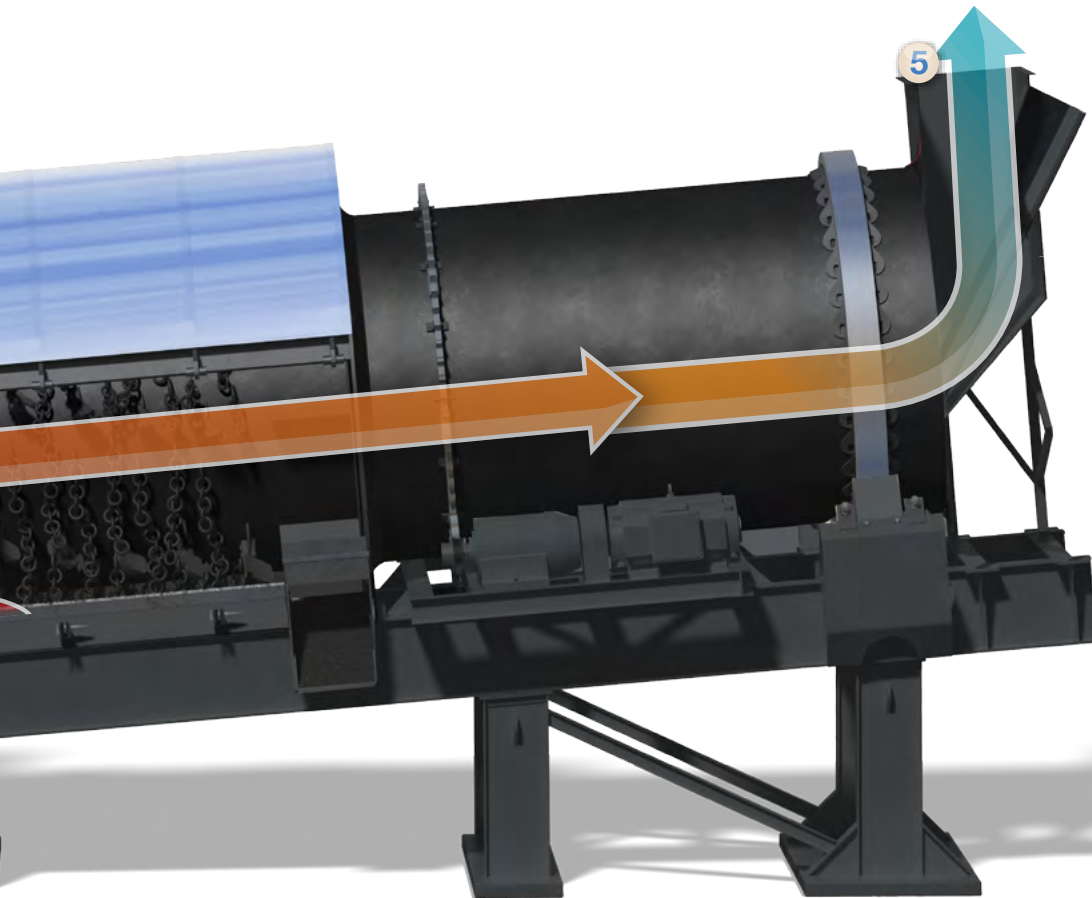
## STEAM

As recycle heats in the mixing chamber by contact with the hot aggregate, moisture in the recycle is driven off as steam. Steam displaces oxygen in the mixing chamber, reducing the potential for mix oxidation.



## BAGHOUSE

Steam from the Double Barrel dryer/drum mixer is passed to the baghouse and out the exhaust stack.



4 Burner flame incinerates the hydrocarbon smoke

5 Steam, dust and fines exit drum through exhaust stack to the baghouse

## REVERSE PULSE BAGHOUSE

Reverse pulse baghouses utilize a damper and a rotating turret to force air directly into the bag filters opposite the normal flow direction. Cleaning is accomplished by isolating a single section of filter bags then reversing the flow of air through them causing gentle expansion. Accumulated dust dislodges from the bag filters and drops into the hopper beneath. Cleaning sequence and timing is adjustable from the control house.



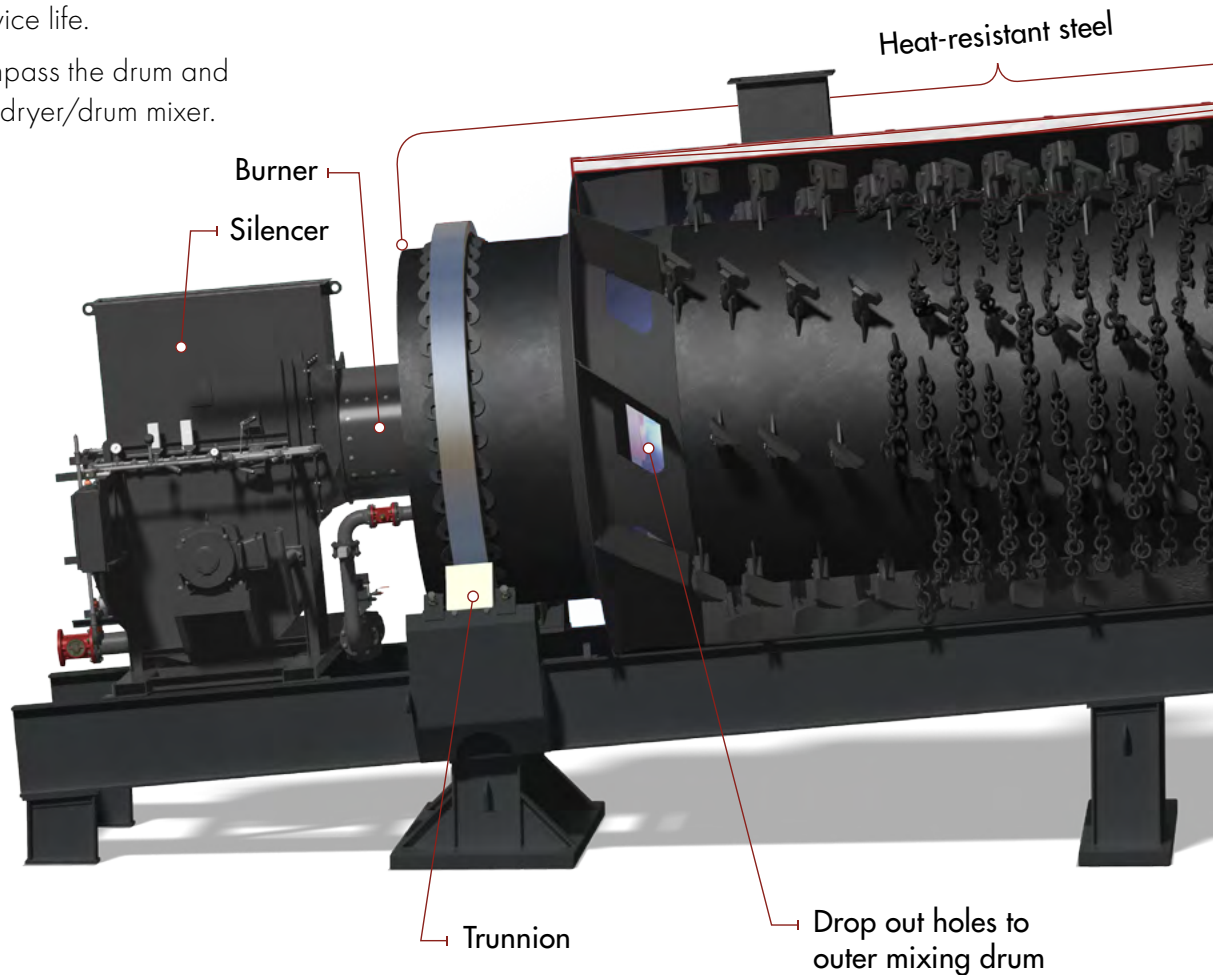
# Double Barrel

## FEATURES

After hundreds of millions of tons of mix production, the Astec Double Barrel dryer/drum mixer proves itself to be the most reliable and cost effective dryer/drum mixer available to producers.

Each trunnion base is angled to the frame, so that a dowel pin in the base is in line with the exact center of the drum. The trunnion base pivots around the pin, making it easy to maintain face contact between the tire and trunnion while making adjustments. Good trunnion alignment means better performance and longer equipment service life.

Two solid-steel tires encompass the drum and support the Double Barrel dryer/drum mixer.



### TRUNNIONS

Adjustable steel trunnions with railroad duty bearings

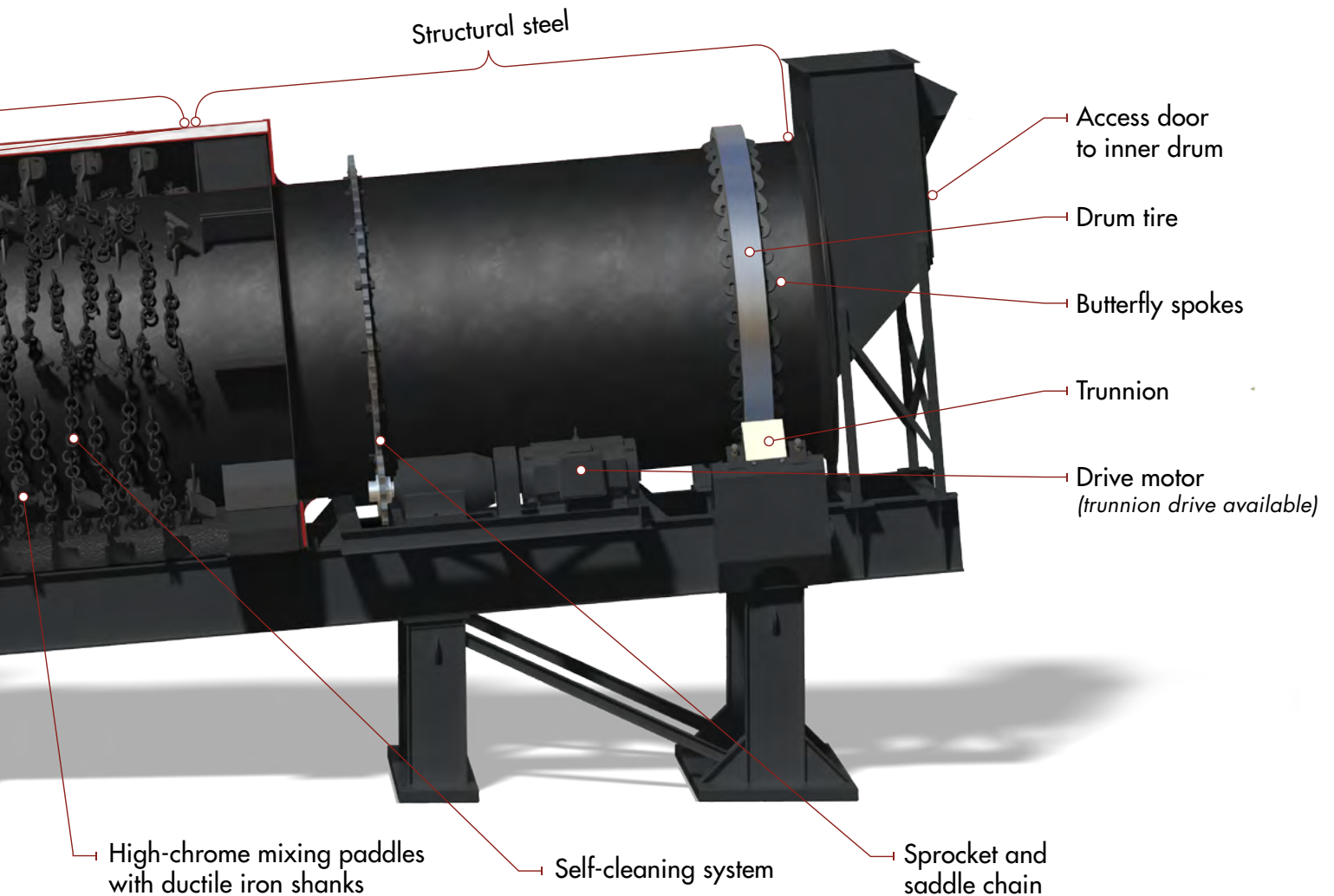


### DRUM TIRES

Hot-forged from solid billets of alloy steel and precision machining, provides ultra-smooth operation



A saddle chain drive is outfitted with a heavy-duty roller chain, including offset sidebars and case-hardened bushings. These heavy-duty drive components are made to last.



### THRUST ROLLERS

Thrust rollers on either side of the tire restrain the drum



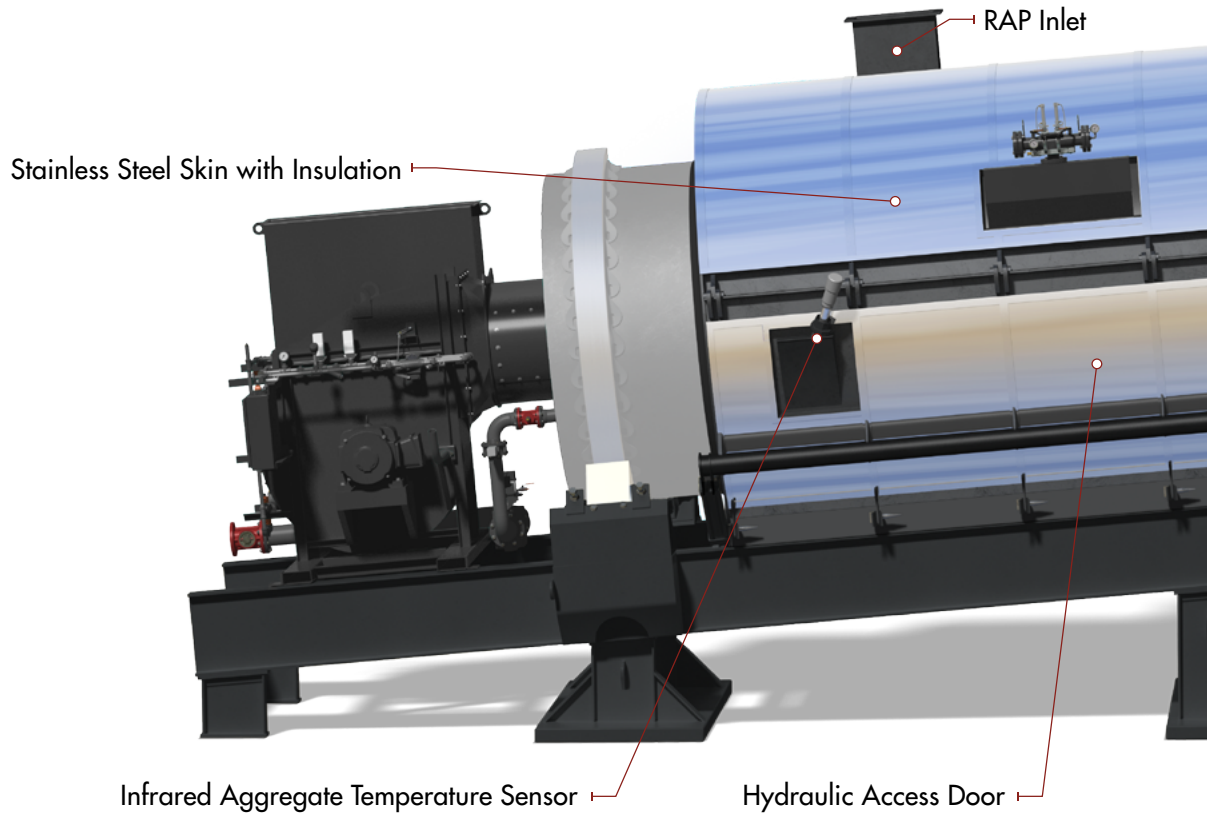
### DRYER ACCESS

The interior of the dryer drum is accessed through a door on the inlet breeching

# Double Barrel

## FEATURES

The cost of maintaining the Double Barrel dryer/drum mixer is comparatively low, because Astec uses proven wear materials. High-chrome, heat-treated, mixer paddle tips and wear plates in the mixing zone stand up to ton after ton of abrasive material. The burner end of the drum, as well as the mixing chamber outershell, are fabricated from a high-strength, low-alloy steel for superior heat-resistance and lined with wear plates at critical wear areas.



### RAP INLET

RAP enters directly into the mixing chamber and does not contact the hot gas stream of the dryer. Because the RAP is heated by the hot aggregate, not the burner, the Double Barrel dryer/drum mixer runs clean, even at 50% RAP. A RAP by-pass chute is incorporated to easily divert RAP to a waiting loader or truck during clean out of bins or calibration.



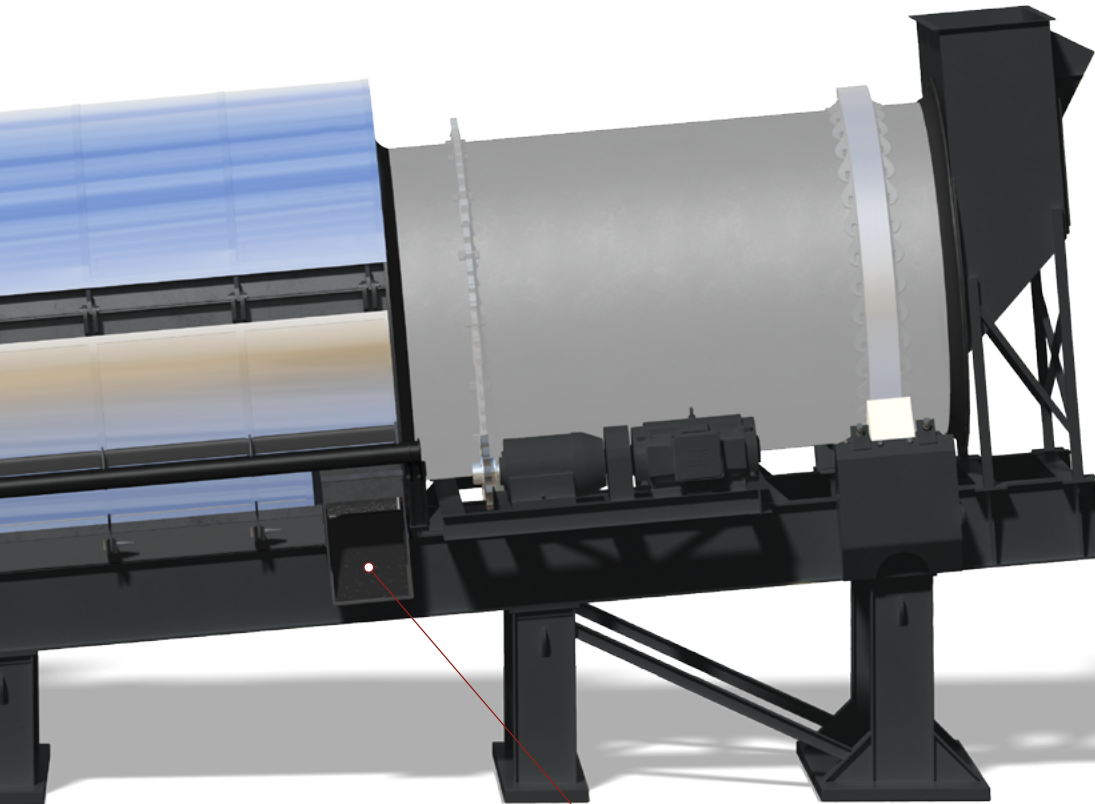
### THICK INSULATION

4" thick insulation under the outer skin of the mixing chamber minimizes heat loss and increases efficiency. In addition, temperature resistant ceramic fiber insulation is used in critical high-heat areas.



## MIXING PADDLES

High-chrome, bolt-on tips with ductile iron shanks for longevity in the field.



Mix Discharge Chute



## OPTIONAL TEMPERATURE SENSOR

Once heated and dried, the aggregate leaves the drying chamber and enters the mixing chamber. At this point, an infrared sensor measures the temperature of the hot aggregate and automatically adjusts burner output to keep aggregate at the required temperature. This unique Astec feature makes it easier to control mix temperatures and to turn out mixes that conform to specifications.



## HYDRAULIC ACCESS DOOR

A large hydraulically operated access door allows easy service of mixing shanks and tips from the outside of the drying drum.







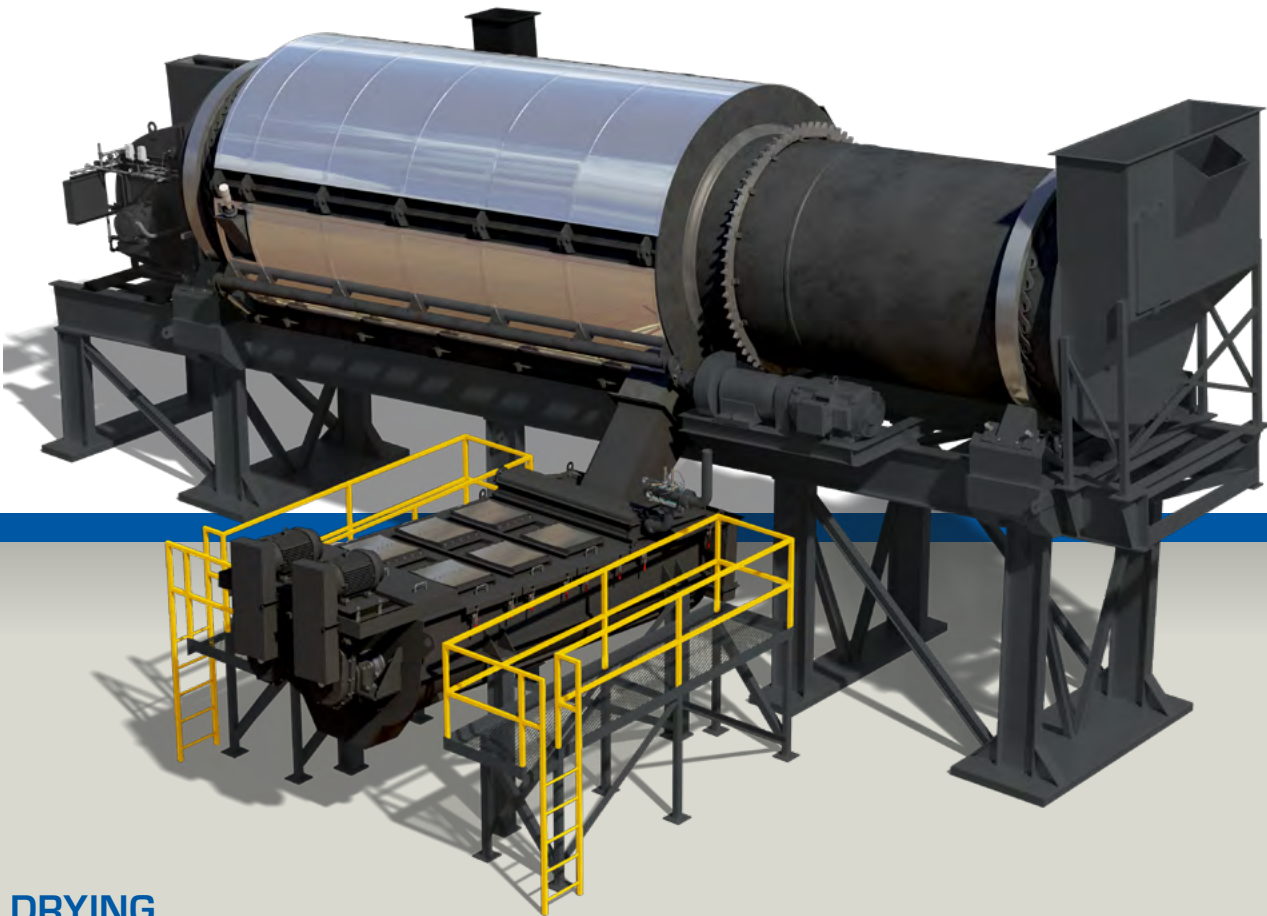




# Double Barrel® X

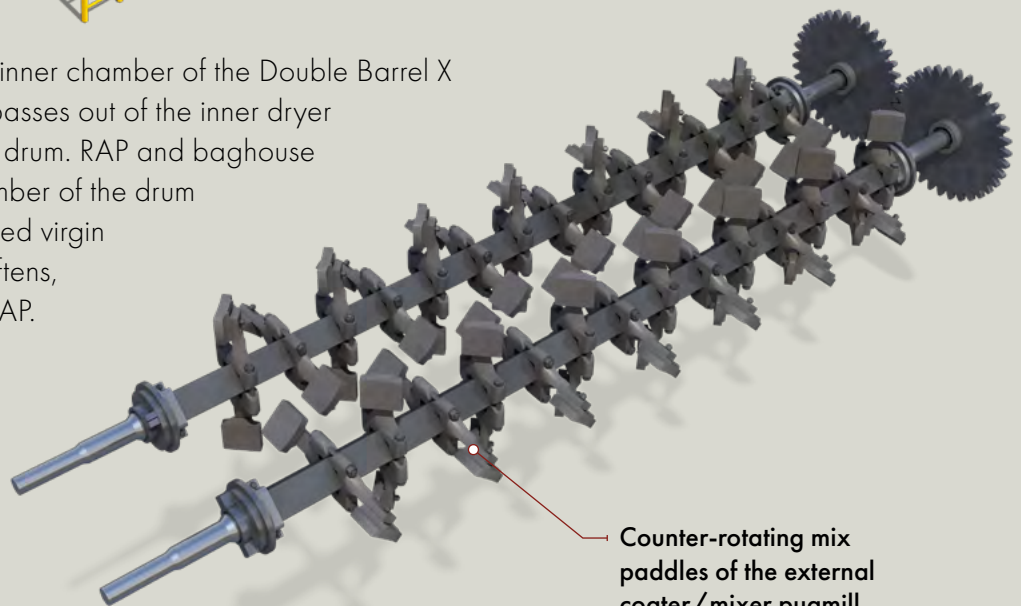
## DRYER DRUM WITH EXTERNAL MIXER

The Double Barrel X system separates the drying process from the mixing process, thereby providing a very reliable tool to be used for the purpose of recycling reclaimed asphalt pavement (RAP). With a Double Barrel X system, a plant can process both warm and hot asphalt mixes with up to 50% RAP content while maintaining zero opacity at the stack.



### DRYING

Virgin aggregate passes through the inner chamber of the Double Barrel X dryer drum. The virgin material then passes out of the inner dryer chamber to the outer chamber of the drum. RAP and baghouse fines are introduced in the outer chamber of the drum where they mix with the already-heated virgin aggregate. As the AC on the RAP softens, the baghouse fines evenly coat the RAP. Preconditioning the RAP through the outer chamber of the Double Barrel X dryer drum flashes off moisture in the drum, thus eliminating the problems associated with scavenger systems.



Counter-rotating mix paddles of the external coater/mixer pugmill

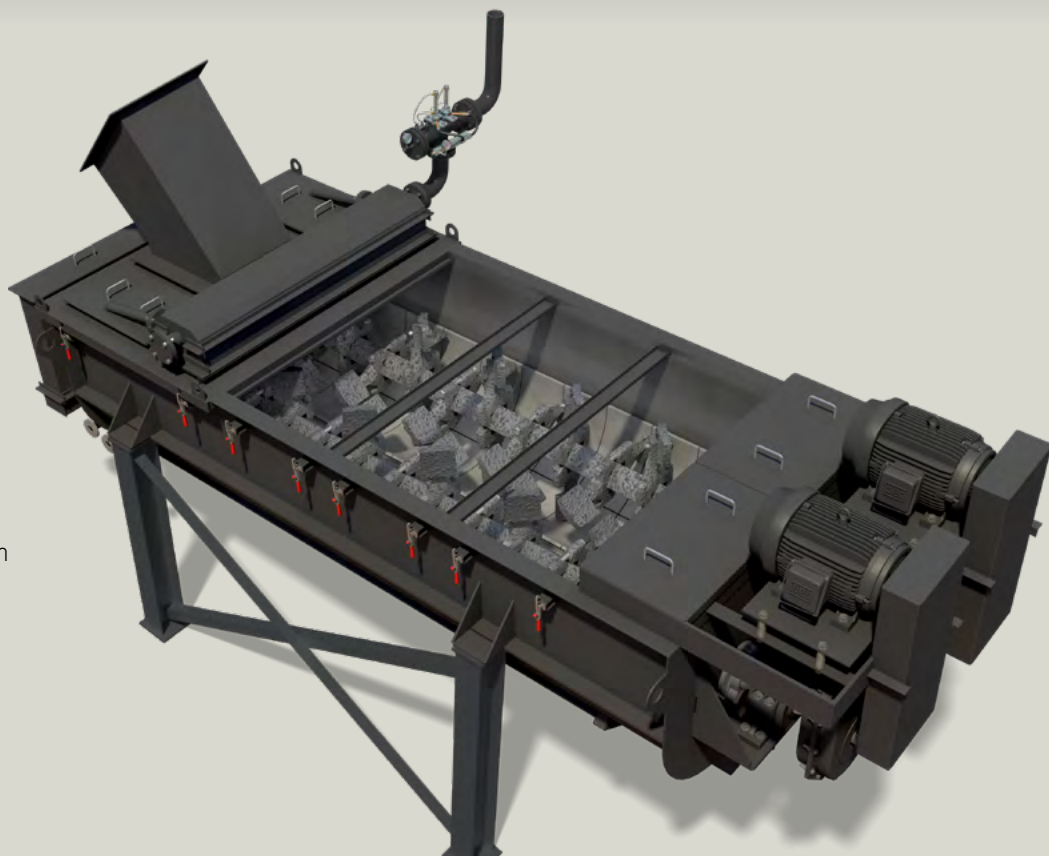




## TWIN SHAFT PUGMILL

After the heated and dried virgin aggregate thoroughly mixes with the RAP and fines, it passes out of the drum dryer/mixer and moves into an external pugmill.\* This is where liquid AC is added. Because the liquid AC only enters in the external mixer, virtually no build-up is produced in the dryer.

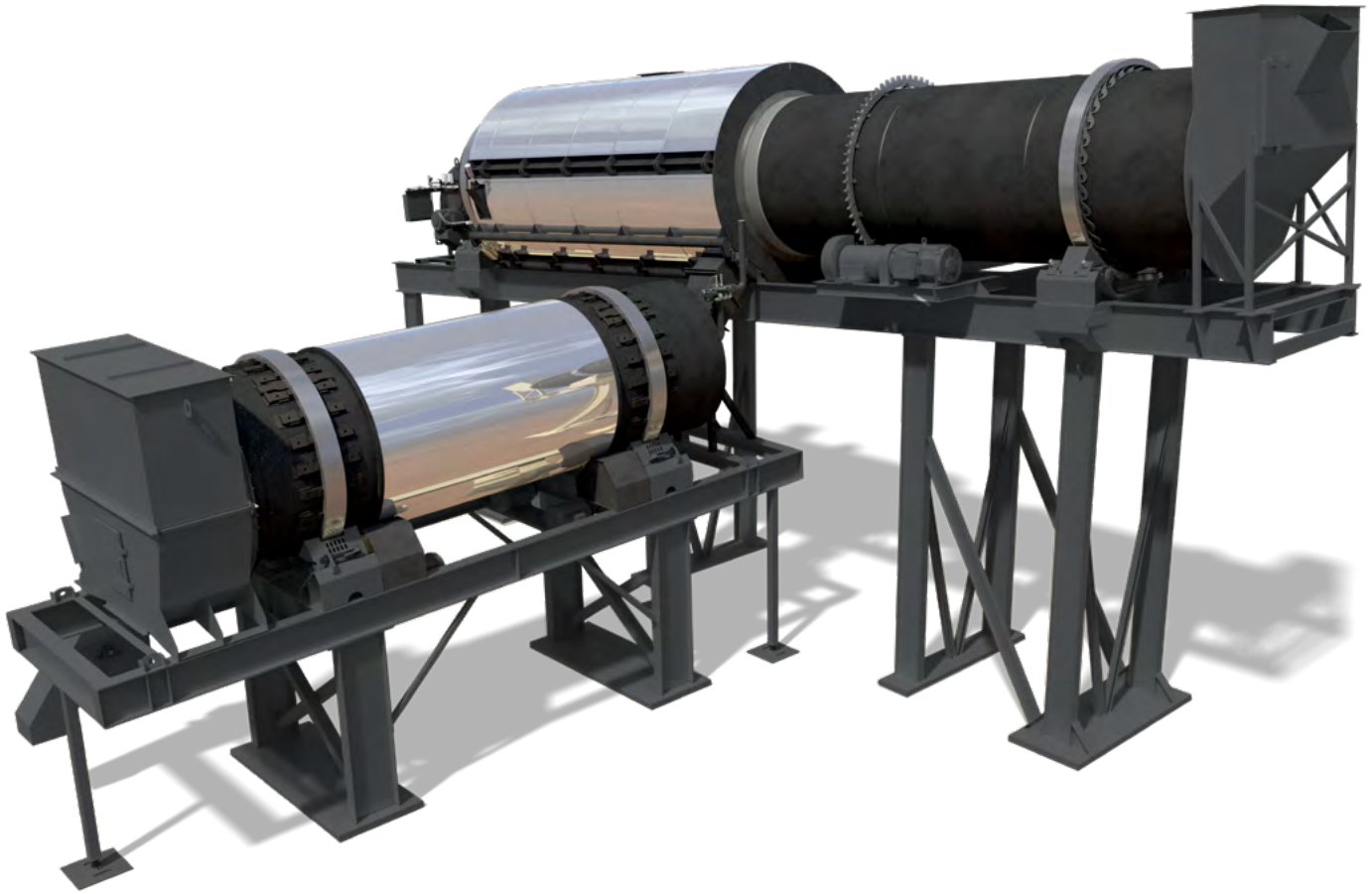
With the addition of an Astec warm mix system, the Double Barrel X system produces warm mix asphalt.



*\*a rotary drum is optional*

# Double Barrel® XHR

## EXTERNAL HIGH RAP MIXER



### MIXING TECHNOLOGY

The Double Barrel XHR employs two mixing technologies proven for over a quarter century in the HMA industry:

- The outer mixing chamber on the dryer gently mixes recycle with dry hot aggregate maximizing heat and binder transfer between RAP, aggregate, and selected admixtures in a rarefied oxygen atmosphere.
- The external mixer vigorously mixes virgin liquid asphalt cement, as well as other admixtures.





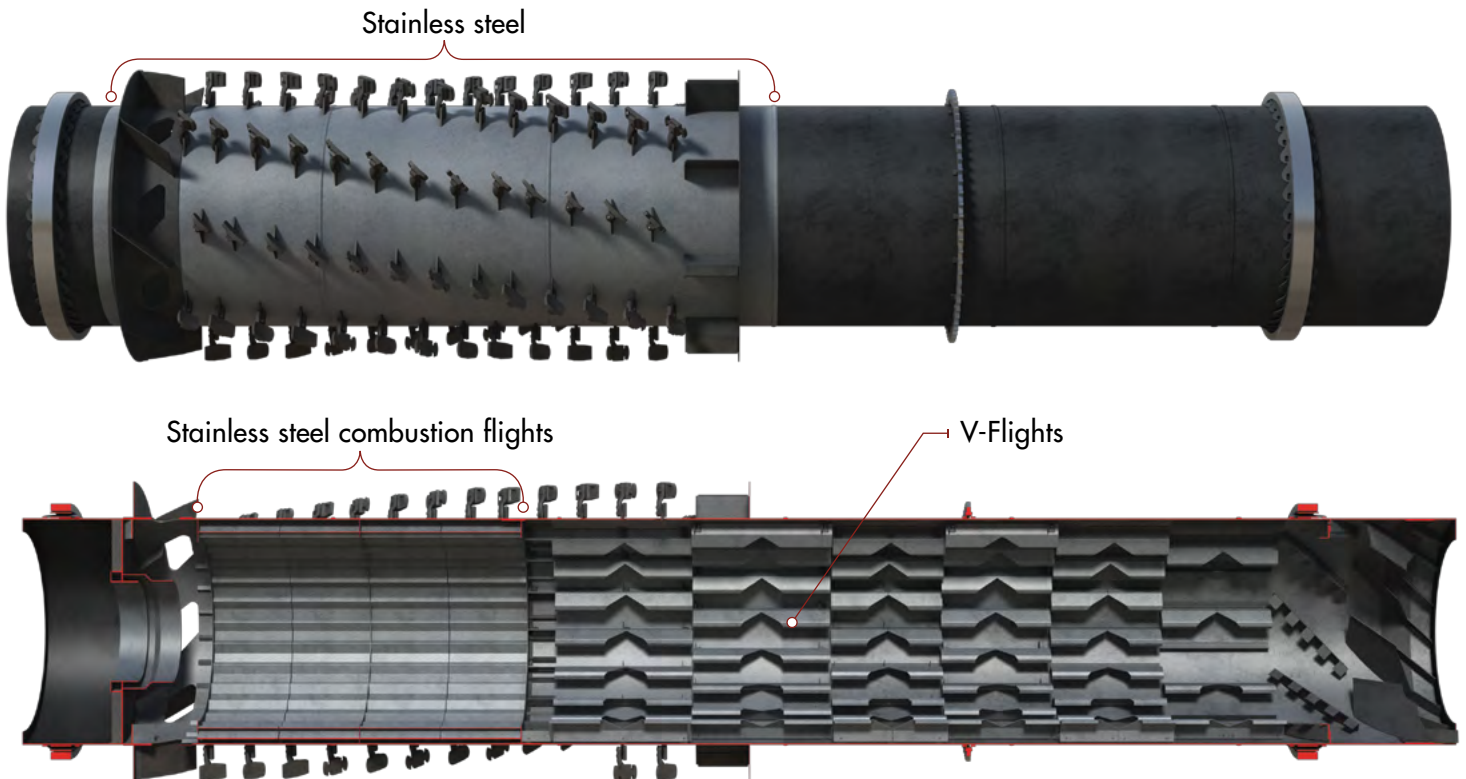
## HIGH RAP AGGREGATE DRYER WITH EXTERNAL MIXER

*The Double Barrel XHR system runs mix with up to 65% RAP\*.*

The Double Barrel XHR achieves a quality high RAP mix. To achieve this quality mix, it utilizes both an outer chamber on the drum and an external mixer with the addition of the V-Pac™ Stack Temperature Control System to maintain as low an exhaust temperature as

possible when running high RAP content. A stainless-steel drum and stainless-steel combustion flights withstand the higher temperatures associated with running high RAP. The Astec warm mix system comes standard on all Double Barrel XHR mixing systems.

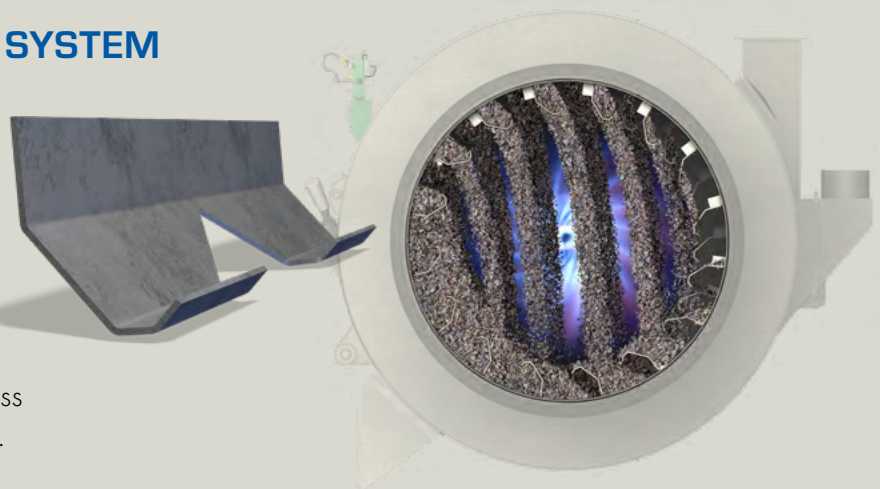
\*65% RAP based on 5% RAP moisture



## V-PAC™ STACK TEMPERATURE CONTROL SYSTEM

Astec's V-Pac Stack Temperature Control System uses v-flights and a variable frequency drive (VFD) drum to help facilitate producing many different types of mixes, while controlling stack temperature, without the added cost and time of flight changes. Astec's v-flights shower along the edge of its notch, as well as its tips, creating a wider veil that increases the effectiveness of the veil by exposing more material to hot gases.

U.S. Patent No. 8,863,404 B1









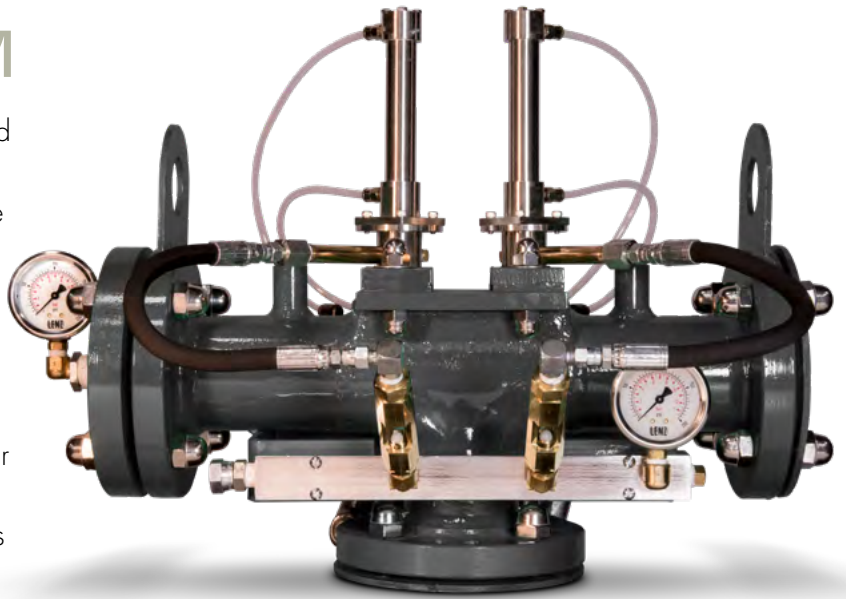




# ASTEC

## WARM MIX SYSTEM

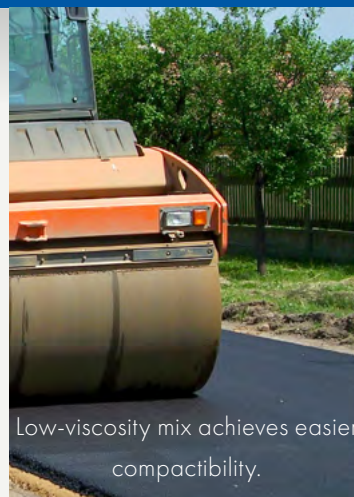
The benefits of warm mix asphalt, such as reduced energy consumption, lowered emissions, and elimination of visible smoke, are well-known in the asphalt paving industry. Warm mix technology allows mix to be prepared and placed at lower temperatures than conventional hot mix. To achieve this, the viscosity of the liquid asphalt cement (AC) must remain low at the reduced temperatures. Maintaining a low viscosity at lower temperatures allows mix to flow freely through storage, transfer, and placement equipment and is more easily compacted.



The Astec warm mix system achieves a lower temperature at a lower cost by eliminating the need for additives or special asphalt cement. Instead, the Astec warm mix system injects a small amount of water into the liquid AC to create microscopic steam bubbles. These small bubbles reduce the viscosity of the liquid AC, allowing the mix to be worked at lower temperatures.

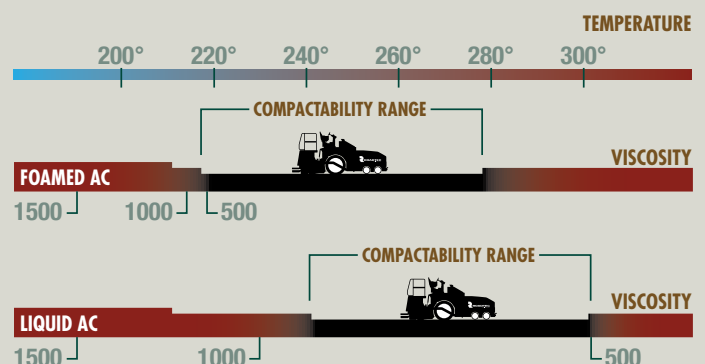
### BETTER COATING

Foamed liquid AC has a greater volume, which allows it to cover a greater surface area, while using the same amount of liquid. This means that the liquid is better distributed over the aggregate. Lower mix temperatures can also increase maximum production rate.



### LESS OXIDATION

Producing asphalt mix at lower temperatures leads to less oxidation, resulting in longer pavement life. Every 25°F increase in temperature doubles the rate of oxidation of liquid AC.





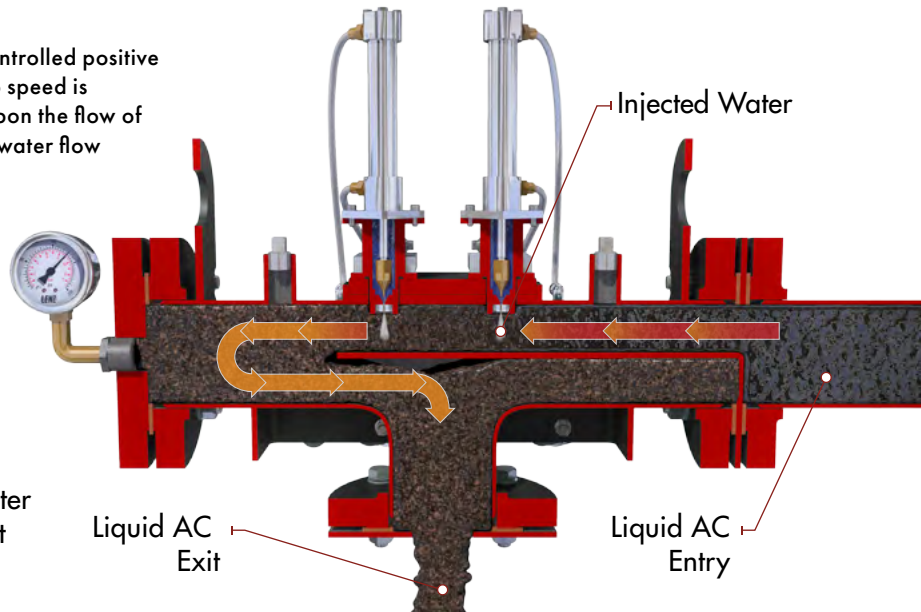
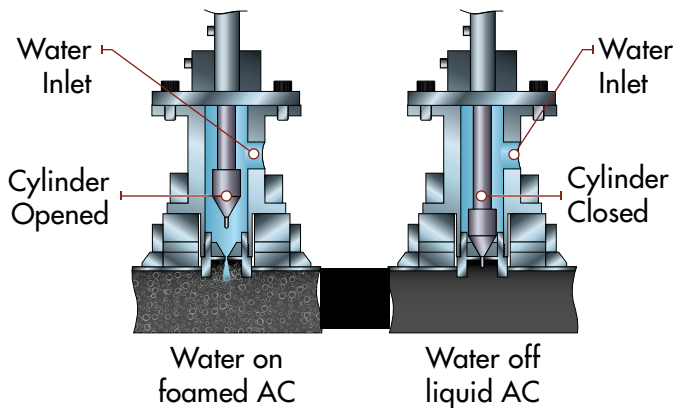
## SOLENOID INJECTION

Water is accurately metered into the system by a feedback-controlled positive displacement piston pump. Using feedback controls, the pump speed is modulated to maintain the appropriate flow of water based upon the flow of the liquid AC. PLC controls provide for smooth and consistent water flow as production rates increase or decrease.

Water is injected into the liquid AC through two stainless steel water injectors which continuously inject high-pressure water into a foaming chamber.

### AC MANIFOLD

Field-proven and highly reliable.



As the water is injected into the liquid AC, the water droplets quickly flash to steam, creating microscopic bubbles of steam that reduce liquid AC viscosity.

## BLUE SMOKE REDUCTION

In the silos pictured below, the left silo contains traditional hot mix asphalt. The right silo contains asphalt mixed at lower temperatures using the Astec warm mix system. It is apparent that there is less blue smoke coming out of the right silo. Less blue smoke means less visible emissions and reduced odor.

The lower amount of blue smoke is not only applicable to the asphalt when it is exiting the silos, but also at the job site where the asphalt is being laid.



## WATER RESERVOIR

A skid-mounted, corrosion-free water reservoir is included with warm mix system packages. An optional cold weather package is available to prevent damage to components during cold weather operations. If supply water is lost, then a low-water alarm alerts plant personnel, so the problem may be resolved quickly without wasting mix. Water reservoir systems are sized based on customer needs.



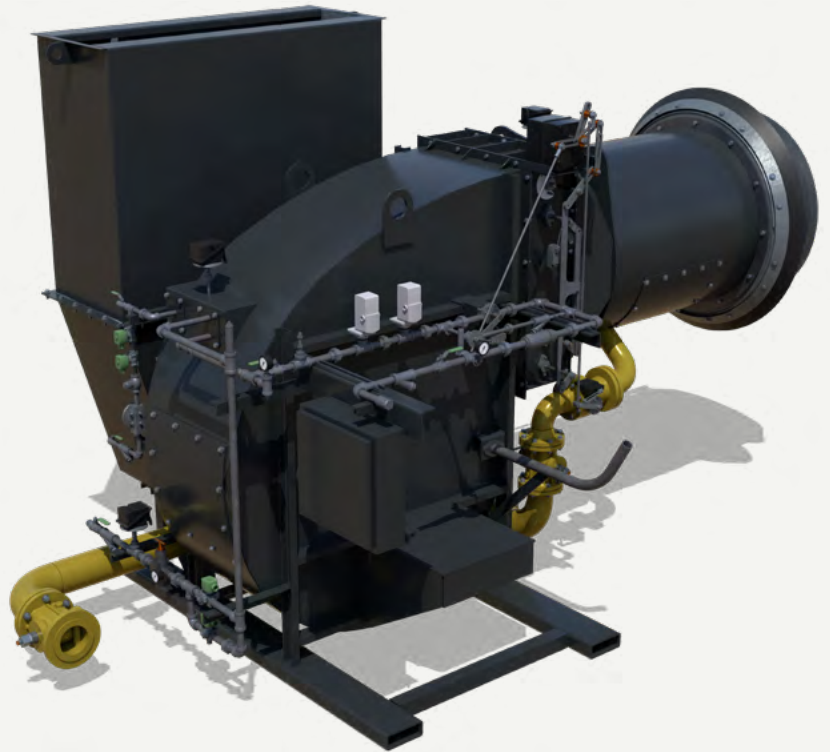
# ASTEC

## BURNERS

Astec offers the most technologically advanced burners in the industry with the Phoenix® and Whisper Jet® burner lines.

### WHISPER JET® BURNER

The Whisper Jet burner delivers unmatched reliability and hassle-free maintenance. The Whisper Jet cleanly and efficiently burns oil or gas and has a compact flame.



## THE MOST TECHNOLOGICALLY ADVANCED BURNERS



### PHOENIX® PHANTOM™ BURNER

Astec's premium Ultra-Low NOx Phoenix Phantom burner leads the pack with the lowest available combustion and noise emissions (gaseous fuels only). The Phantom also achieves the highest electrical energy efficiency with innovations like variable speed drives. The Phantom offers advanced mixing technology and the latest technological innovations to deliver the absolute minimum gaseous emissions available today.



### PHOENIX® TALON II™ BURNER

The Astec Phoenix Talon II burner sets the standard for power and efficiency, while maintaining very low emissions. With the optional silencing package, it is quiet enough to have a phone conversation on the burner platform while it is firing.



### PHOENIX® FURY™ BURNER

A robust build and simple, accessible construction makes the Astec Phoenix Fury burner a great cost-effective choice. Compared to other open-fired designs, the Fury burner achieves better emissions and fuel efficiency by putting 50% more combustion air through the burner.

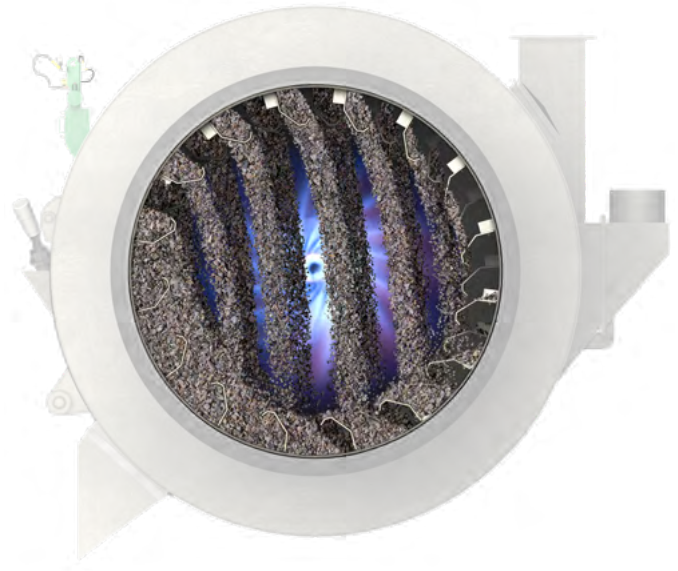


# Optional

## V-PAC™ SYSTEM

In today's market, many asphalt plants produce a wide range of mixes. Switching between mixes or significantly varying tonnage rates can cause swings in stack temperatures. If these temperature swings exceed the limits of the baghouse adjustments to the flighting arrangement must be made to prevent baghouse damage. These changes can be costly and time consuming, especially if changes are needed when the mix type changes.

The V-PAC combines Astec's v-flights and a variable frequency drive (VFD) drum to enable optimization of stack temperature, for a broad range of mix types without costly flighting changes. V-flights are uniquely designed to maximize heat transfer by exposing more material to the heat produced by the burner.

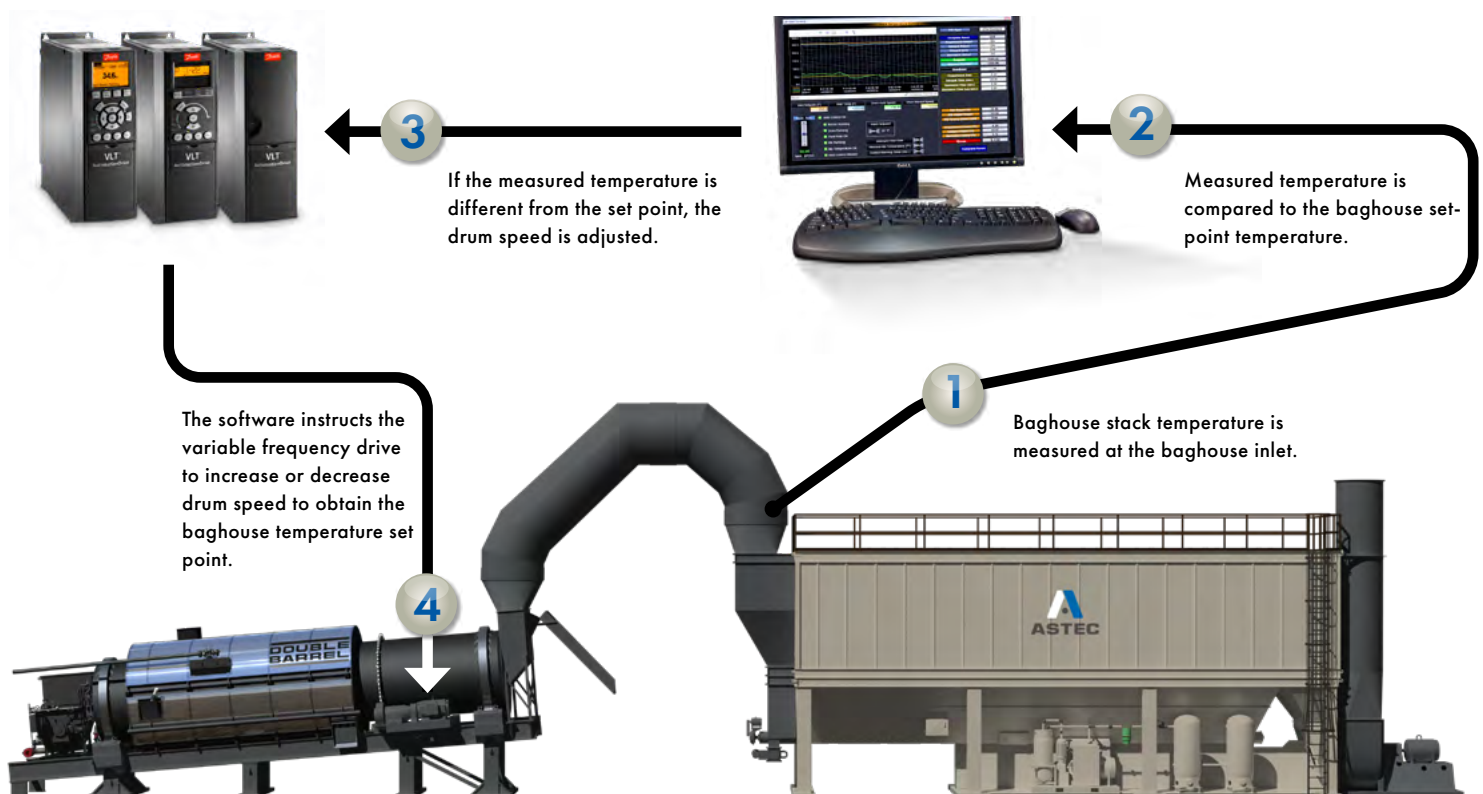


### V-FLIGHT VEIL

The Astec v-flight is taller and incorporates a v-shaped notch. The increased size allows the v-flight to carry the same amount of material as a standard flight. Material begins to veil through the notch sooner and, instead of just showering from the tip, v-flights shower along the edge of the notch, as well as the tip. The result is a more even veil at both higher and lower tonnage rates, which increases the effectiveness of the veil by exposing more material to hot gases.

## V-PAC

### STACK TEMPERATURE CONTROL SYSTEM



# ASTEC Drum Comparison Chart



**DILLMAN  
UNIDRUM**



**DOUBLE  
BARREL**



**DOUBLE  
BARREL X**



**DOUBLE  
BARREL XHR**

MAX RECYCLE*	0%				
	30%				
	40%				
	50%	X	X	X	
	65%				X
PRODUCTION RANGE (TPH)	150		X		
	180		X		
	200		X	X	X
	250		X	X	X
	300	X	X	X	X
	400	X	X	X	X
	500	X	X	X	X
	600	X	X	X	X
KEY FEATURES	Enhanced Materials?	NO	NO	NO	YES
	Veiling End Drum Shell Material	Heat-Resistant Steel	Structural Steel	Structural Steel	Structural Steel
	Burner End Drum Shell Material	Heat-Resistant Steel	Heat-Resistant Steel	Heat-Resistant Steel	Stainless Steel
	Combustion Flighting Materials	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
	Warm Mix System	Optional	Optional	Optional	Standard
	V-PAC	Optional	Optional	Optional	Standard
	Self-Cleaning Drum	NA	Yes	NA	NA
	Mixing Location	All Constituents Mixed Behind the Extended Burner Nose	All Constituents Mixed in Outer Shell of Double Barrel	Recycle, Baghouse Dust, and Additives Mixed in Outer Shell of Double Barrel; AC Added in External Mixer	Recycle, Baghouse Dust, and Additives Mixed in Outer Shell of Double Barrel; AC Added in External Mixer

\* Max Recycle at 5% RAP Moisture  
50% is achieved with patented V-Pac







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