

Superior Petroleum Storage Tank Mixing

Side Entry Mixers for Refining, Pipelines and Storage





Philadelphia Mixing Solutions and its subsidiary Mixing Solutions Limited, lead the industry in optimizing in-tank mixing solutions to help customers improve mission-critical mixing processes. With operations in Palmyra, Pennsylvania, United States and Newbury, United Kingdom, Philadelphia Mixing Solutions provides innovative products, technical services and field support to customers around the world. Backed by 60 years of industry experience, Philadelphia Mixing Solutions' research and development teams use cutting edge process modeling, testing and field testing to create unique mixing solutions to meet the individual customer requirements.

ISO 9001:2008 certified, ATEX compliant equipment (where applicable)





BSER AND ADVANCED PITCH PROPELLER

Purpose Designed for 21st Century Oil Storage Needs

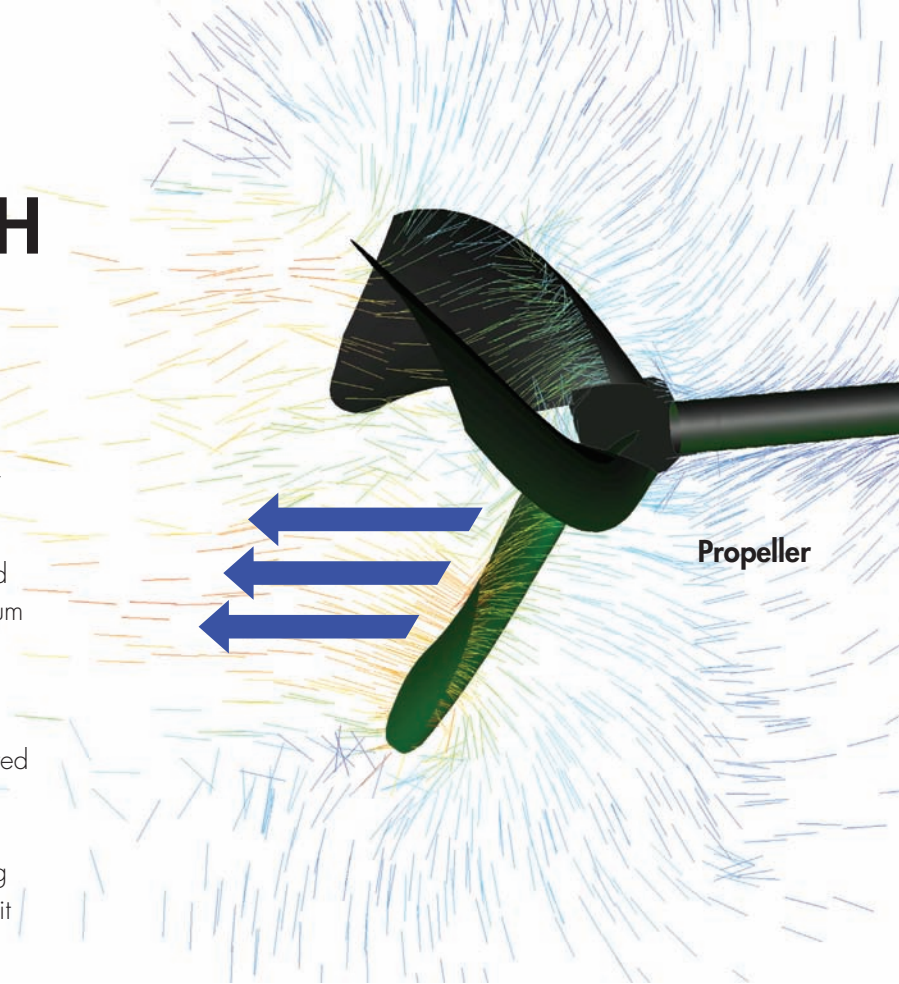
The BSER Mixer (Belt Side Entry Mixer for Rugged Environments) and Advanced Pitch Propeller are the next-generation innovations for petroleum storage tanks. The BSER mixer was designed with and for operators to improve efficiency, blend product or oils more rapidly, and allow for timely and economical maintenance in the field. The patented Advanced Pitch Propeller is a breakthrough design that creates a superior directional or collimated flow in liquids. This allows mixing to occur faster with fewer individual mixers, and with less power than competitive products.

The BSER and Advanced Pitch Propeller are 21st Century designs to meet the needs of 21st Century customers.

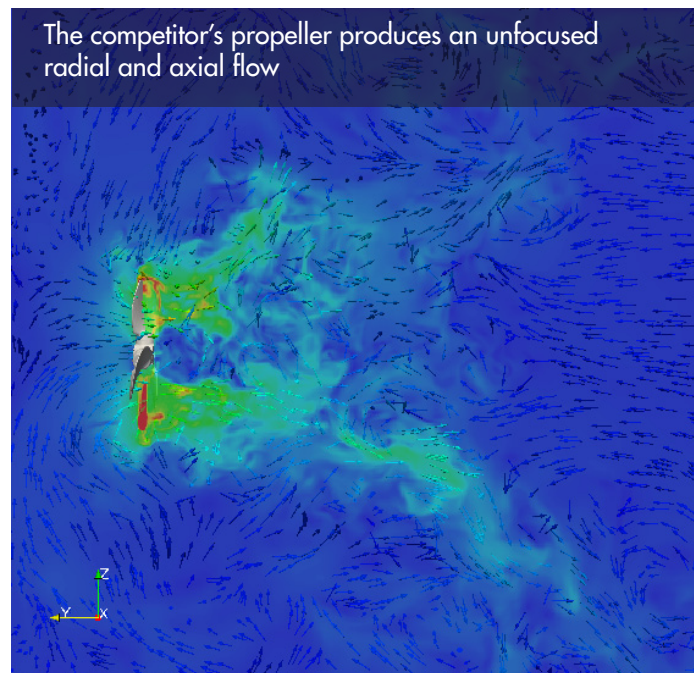
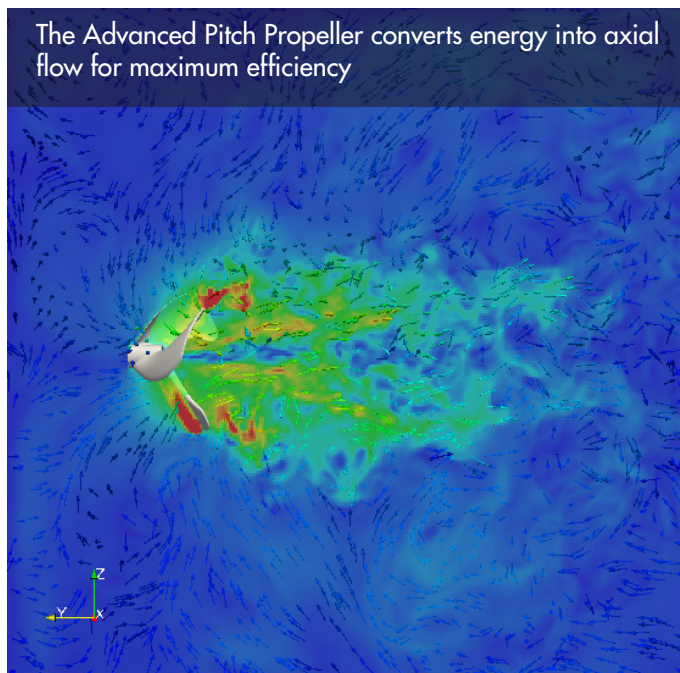
ADVANCED PITCH PROPELLER

Optimized Propeller Design for Petroleum Storage Tank

The Advanced Pitch Propeller is purpose-designed for the demanding mixing applications in Petroleum Storage tanks. Philadelphia Mixing Solutions reshaped the forward rake of the propeller to create a patented circular rake that produces superior collimated flow in crude oil. The collimated flow is strong enough to reach across a storage tank with velocity to lift solids off the tank floor. The Advanced Pitch Propeller outperforms leading competitive designs that can lose velocity in transit across a tank diameter.

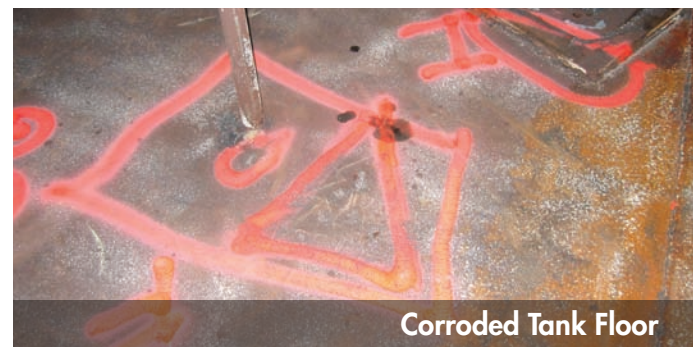
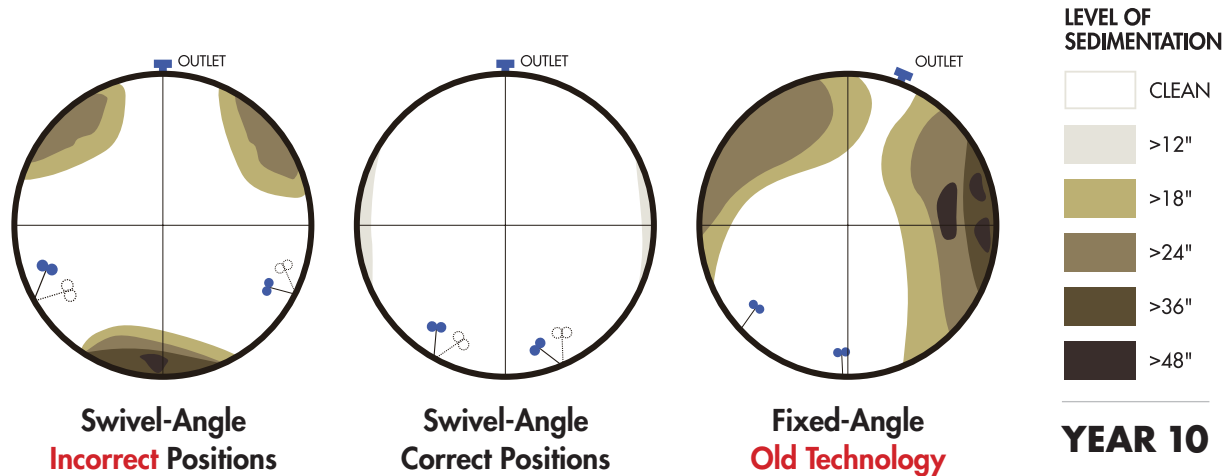


Comparison of Flow Vector Plots at Equal Power



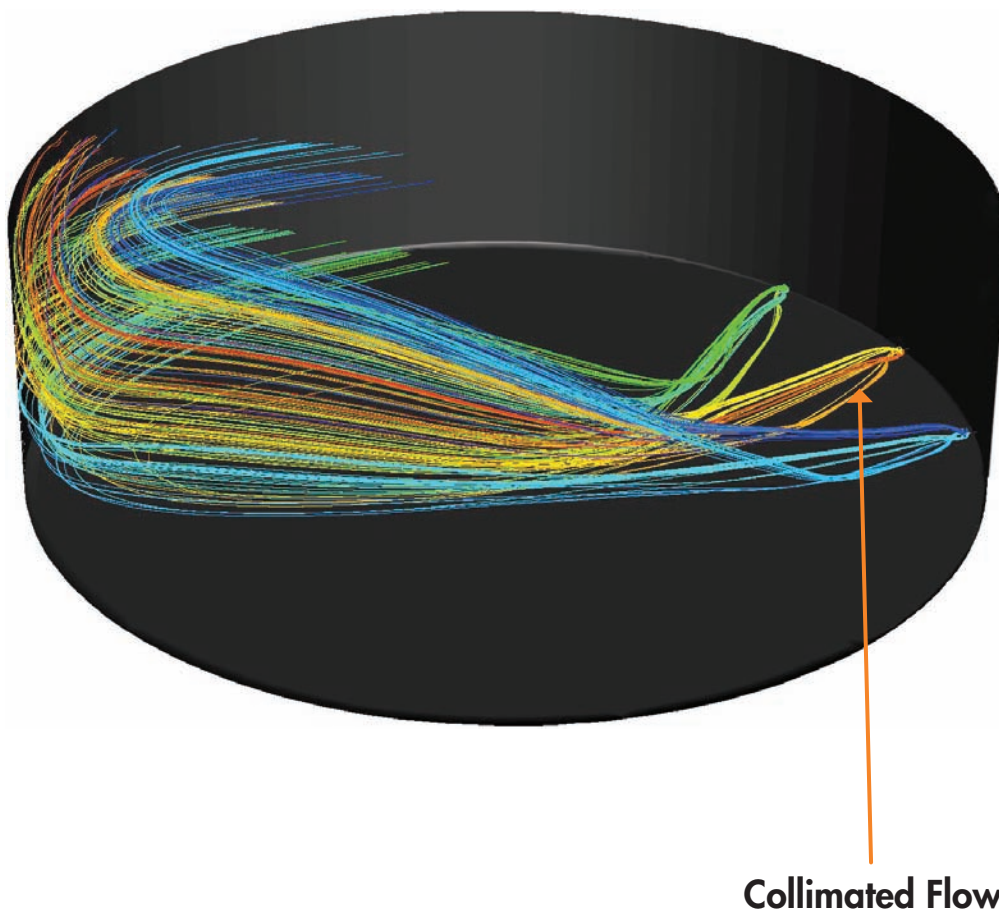
THE BEST SOLUTION FOR BOTTOM SEDIMENTATION AND WATER CONTROL

Sediment, water and wax can accumulate in storage tanks that are inadequately mixed. The Advanced Pitch Propeller solves this problem with a collimated flow that can sweep the floor of the tank, re-suspend sludge and clean the floor and tank shell. This reduces the risk of catastrophic failure in the tank and saves API 2016 tank cleaning expense during API 653 and EEMUA 159 inspections.



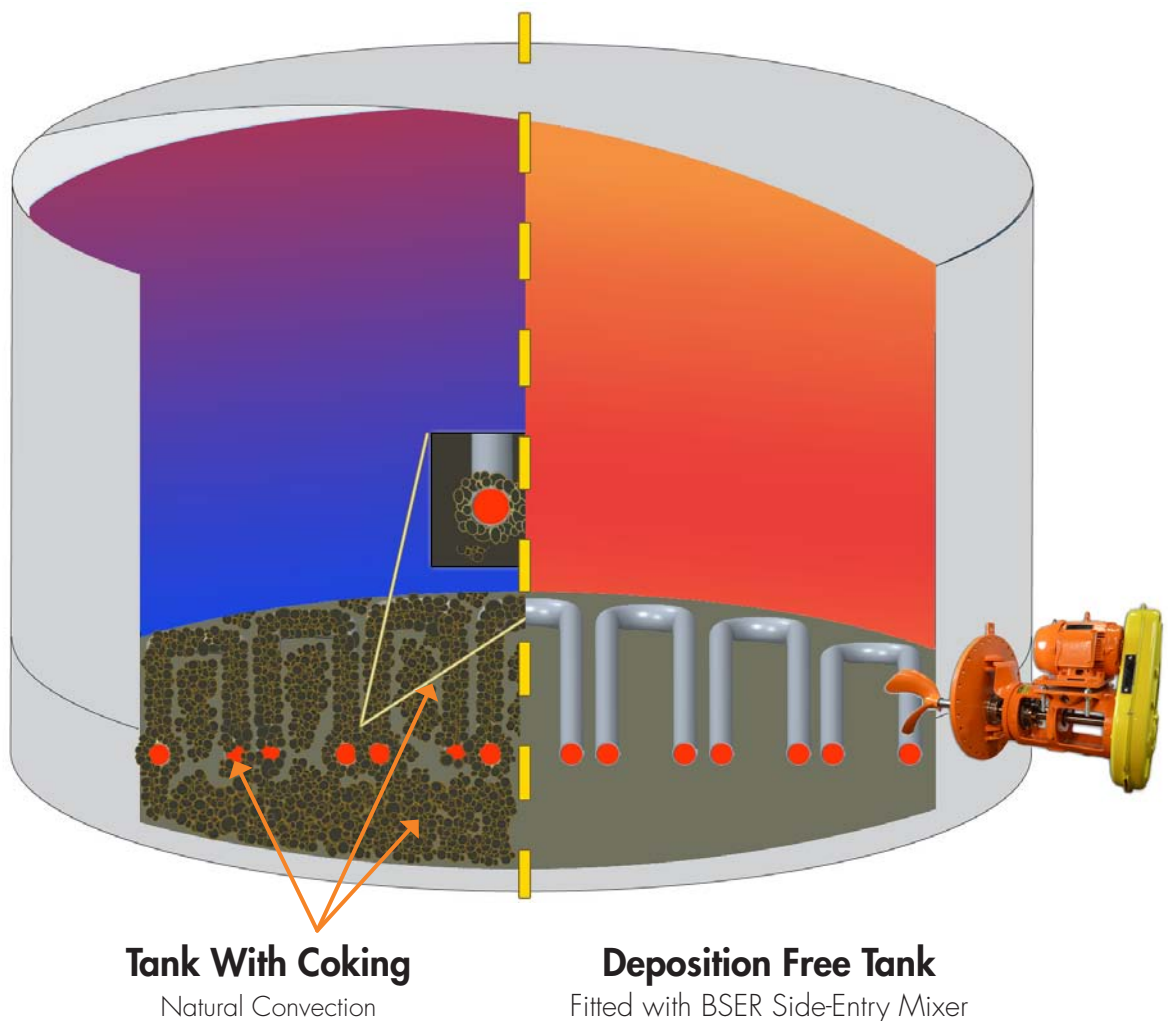
BETTER BLENDING AND MIXTURE HOMOGENEITY

Whether blending different crude oils or mixing additives into intermediate or finished fuels, the best solution for oil or petroleum storage tanks is the Advanced Pitch Propeller. The high velocity flow of the mixers on a tank creates cross-tank and bottom-to-top-to-bottom mixing action in the product. This three-dimensional mixing action blends more efficiently and more rapidly than traditional propeller technology. The operators can blend and discharge their product more quickly, on specification and generate more tank turns during a year than with other options.



OPTIMUM TEMPERATURE CONTROL PERFORMANCE

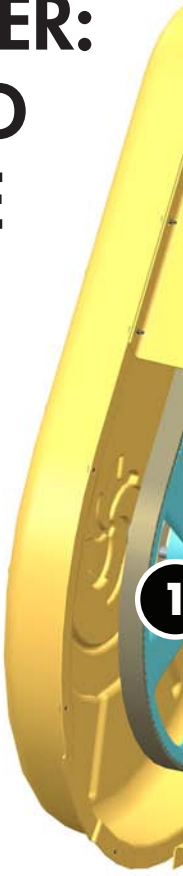
Higher velocity collimated flow generated by the propeller can penetrate highly viscous asphalt (bitumen) or fuel oil. The propeller thrust moves product through temperature zones in the tank to create uniformity (bottom-to-top-to-bottom) which readies the product for distribution. The Advanced Pitch Propeller creates fluid velocity that effectively eliminates coking on heating elements and tank floor.

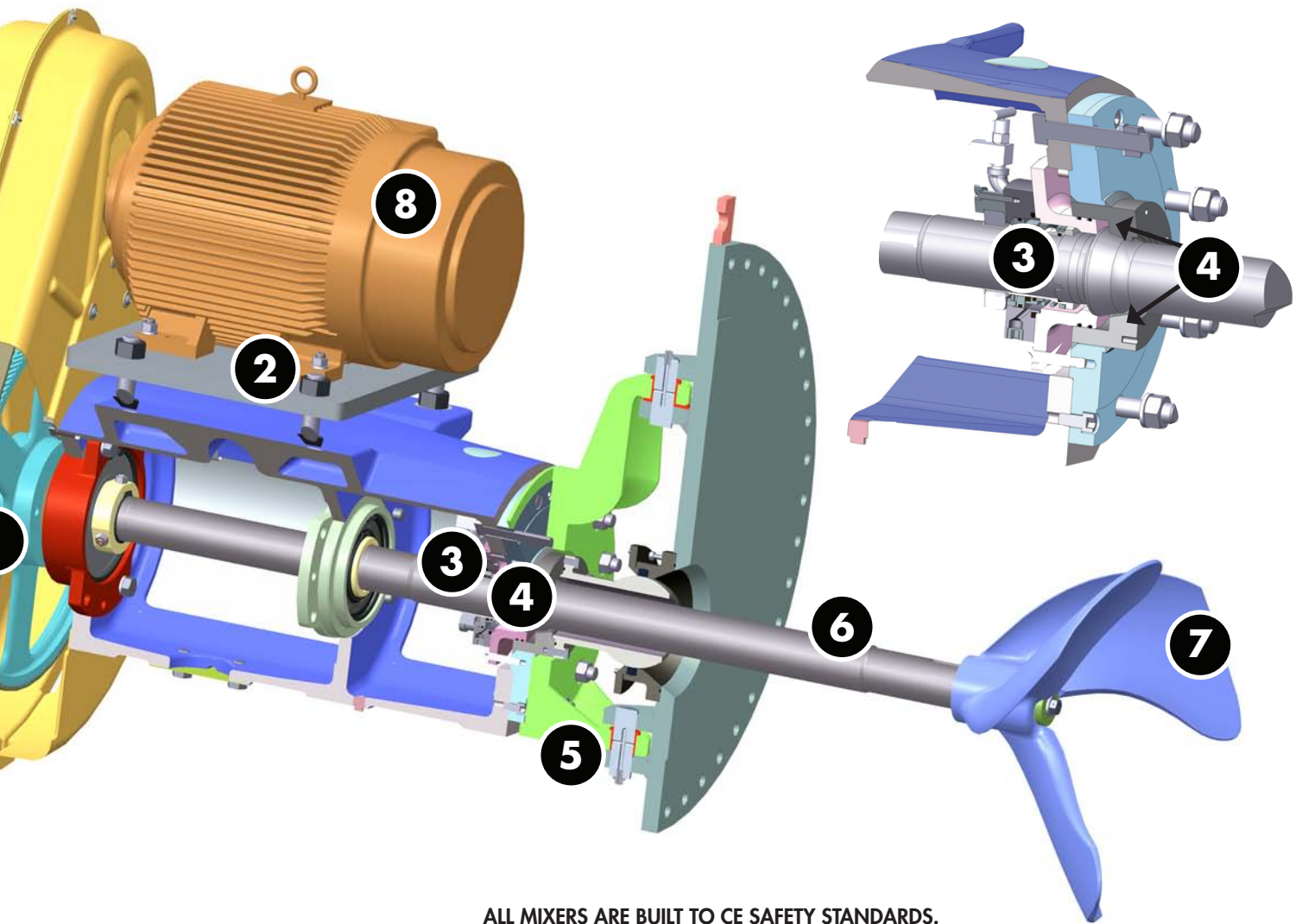


REDUCED EQUIPMENT REQUIREMENT ON STORAGE TANKS

The performance of the Advanced Pitch Propeller allows tank operations to be conducted with fewer mixers. For example, a 750,000 bbls tank in heavy crude oil service could be mixed with four rather than five side entry mixers. Mixers are positioned so that the primary collimated flow combines into an entrained flow for more directional mixing in the tank. Swivel mixers can be choreographed to create a movable collimated flow pattern for better tank sedimentation control. In this example, the overall reduced equipment requirement saves the capital, installation (motor starters, cabling, structural support, ancillary equipment), operating, energy and maintenance costs equivalent to one mixer per tank.

BSER MIXER: DESIGNED WITH THE USER IN MIND





**ALL MIXERS ARE BUILT TO CE SAFETY STANDARDS.
ATEX CATEGORY 2 AND CATEGORY 3 AVAILABLE ON REQUEST**

1. RUGGED TRANSMISSION—High-torque toothed belt drives provide long and trouble-free mixer operation.

2. DURABLE MOTOR MOUNT—Rigid motor mounting for better reliability and extended drive belt life.

3. CARTRIDGE SEAL—For ease of field replacement.

4. UNIQUE SHUT-OFF DEVICE—Positive locking, corrosion resistant, stainless steel metal-to-metal tapered seat faces to ensure ZERO leakage. Eliminates environmental spill risk and provides a safer work area for staff. No need to empty tank for routine maintenance.

5. SWIVEL ANGLE OPTION—60° rotation of mixer ensures the tank floor is scoured to effectively prevent BS&W build-ups. The swivel ball is sealed with a hydraulic ball seal for ZERO leakage.

6. STAINLESS STEEL SHAFT—This one piece design eliminates corrosion and maintains the integrity of the tank shutoff device.

7. SUPERIOR PROPELLER DESIGN—The Advanced Pitch Propeller utilizes the latest technology in propeller design. The patented geometry creates a stronger collimated flow across the tank to produce up to a 40% improvement in efficiency.

8. MOTOR OPTIONS— IEC/NEMA Frames, Arctic Duty, Explosion Proof, Chemical Duty, Tropical Duty, UL, CUL or CSA Motors, IEEE 841, ATEX.

RAPID AND ECONOMICAL MAINTENANCE

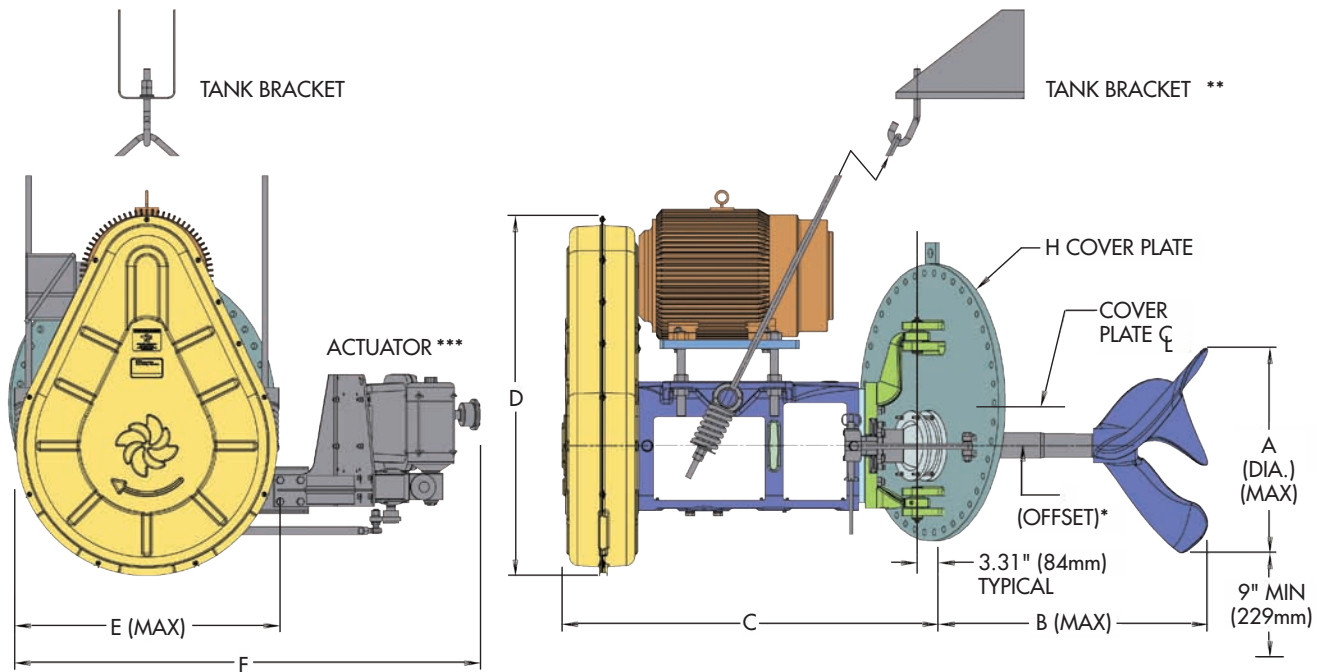
Deep groove ball bearings mounted on sleeves protect the shaft from damage during operation and maintenance. These bearings have a minimum L-10 bearing life of 60,000 hours.

FIXED ANGLE DESIGN—The BSER is also available in fixed angle configurations for blending applications.

AUTOMATIC SWIVEL OPTION—Allows the mixer to be automatically adjusted to desired angles without manual adjustment.

BSER-S MIXER

Swivel Angle Side-Entry Mixer



Model Shaft Dia. at Seal		BSE-6 1.875"	BSER-8 65mm	BSER-10 80mm	BSER-12 90mm
MOTOR POWER		3 - 15 HP / 2.2 - 11 KW	15 - 30 HP / 11 - 22 KW	30 - 50 HP / 22 - 37 KW	50 - 75 HP / 37 - 55 KW
NOMINAL SPEED (RPM)	BELT DRIVE	444 (based on 1775 rpm) 443 (based on 1480 rpm)	444 (based on 1775 rpm) 449 (based on 1480 rpm)	431 (based on 1775 rpm) 423 (based on 1480 rpm)	423 (based on 1775 rpm) 423 (based on 1480 rpm)
A (dia)	ins/mm	19.52/496	23.86/606	26.21/666	30.08/764
B	ins/mm	25.02/636	29.46/748	34.41/874	37.54/954
C	ins/mm	39.27/997	42.68/1084	52.70/1339	52.70/1339
D	ins/mm	40.3/1024	40.3/1024	50.3/1278	50.3/1278
E	ins/mm	37.0/940	37.0/940	37.0/940	37.0/940
F	ins/mm	61.5-45.5/1562-1143	65.2-48.0/1656-1219	65.2-48.0/1656-1219	65.2-48.0/1656-1219

Dimensions are not to be used for construction

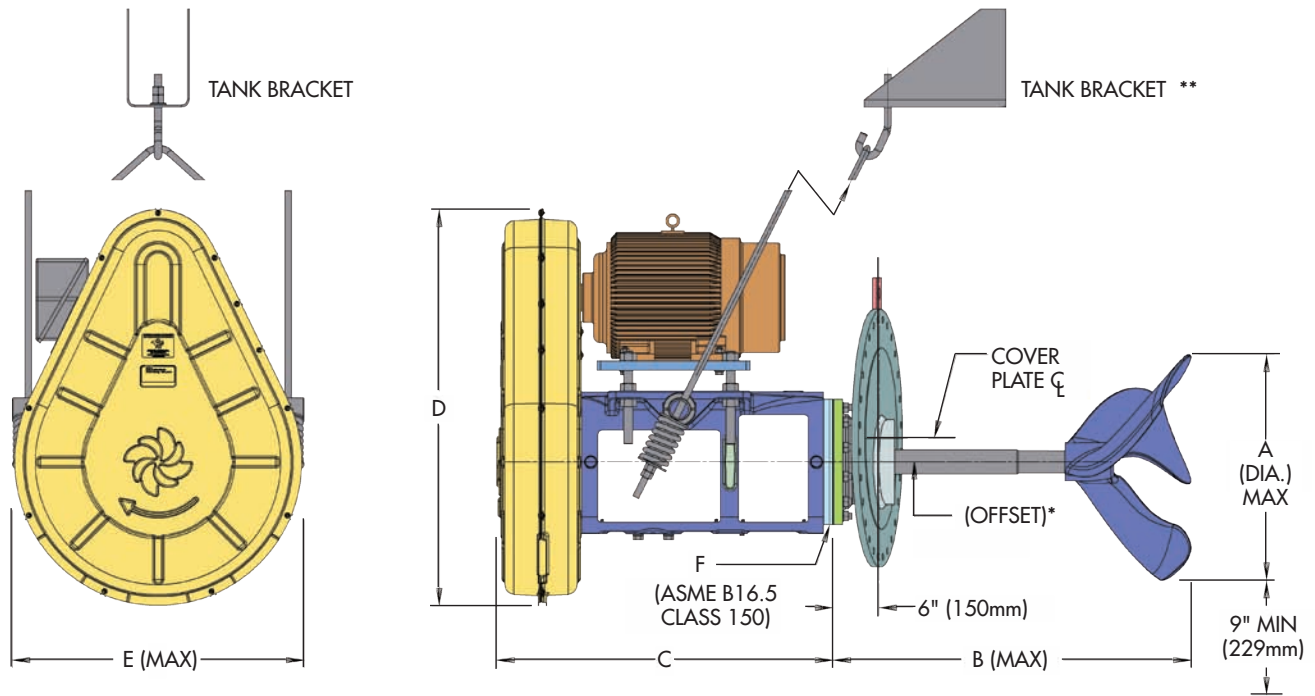
* Offset determined at construction.

** Slings or caster support required on BSER-10 and BSER-12. Weld-on tank bracket is optional.

*** Actuator is optional.

BSER-F MIXER

Fixed Angle Side-Entry Mixer



Model		BSE-6	BSER-8	BSER-10	BSER-12
Shaft Dia. at Seal		1.875"	65mm	80mm	90mm
MOTOR POWER		3 - 15 HP / 2.2 - 11 KW	15 - 30 HP / 11 - 22 KW	30 - 50 HP / 22 - 37 KW	50 - 75 HP / 37 - 55 KW
NOMINAL SPEED (RPM)	BELT DRIVE	444 (based on 1775 rpm) 443 (based on 1480 rpm)	444 (based on 1775 rpm) 449 (based on 1480 rpm)	431 (based on 1775 rpm) 423 (based on 1480 rpm)	423 (based on 1775 rpm) 423 (based on 1480 rpm)
A (dia)	ins/mm	19.52/496	23.86/606	26.21/666	30.08/764
B	ins/mm	34.0/864	38.34/974	44.40/1128	47.54/954
C	ins/mm	30.28/769	32.78/833	42.70/1084	42.70/1084
D	ins/mm	40.3/1024	40.3/1024	50.3/1278	50.3/1278
E	ins/mm	37.0/940	37.0/940	37.0/940	37.0/940
F	ins/mm	8/203	8/203	10/254	10/254

Dimensions are not to be used for construction

* Offset determined at construction.

** Slings or caster support required on BSER-10 and BSER-12. Weld-on tank bracket is optional.



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