BETE
PERFORMANCE SPRAY ENGINEERING

TURBOMIX®
EDUCTOR NOZZLE

IMPROVE YOUR MIXING AND AGITATING PERFORMANCE WITH BETE TURBOMIX EDUCTOR NOZZLES

BETE TurboMix eductors provide a cost-effective and efficient solution for circulating and mixing liquids in closed and open tanks. With no moving parts, these eductors are inherently resistant to clogging and require minimal maintenance. Many applications that require the continuous mixing of immiscible liquids or the suspension of solids can achieve this with just a pump and submerged spray nozzles, which significantly increases system complexity, capital costs, and maintenance requirements.

TurboMix eductor nozzles are designed to reduce the settling of suspended solids, improve circulation, maintain uniform liquid characteristics, mix chemicals, and move solids along the bottom of a tank. The TurboMix offers a lightweight and inexpensive alternative to traditional mechanical mixing methods.

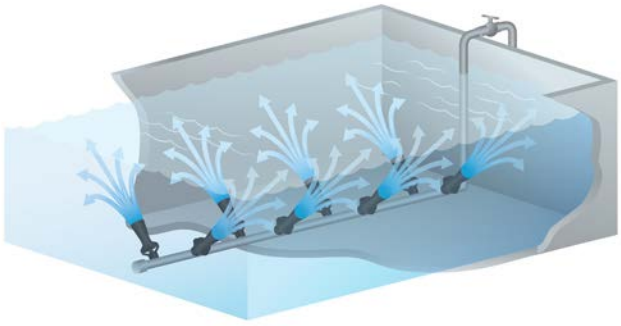
DISCOVER THE VERSATILITY OF TURBOMIX

- **Aerobic and anaerobic digesters**
- **Avoiding bacteria growth or preventing thermal stratification**
- **Sweeping sludge and sediment from tank bottoms**
- **Blending ethanol and biodiesel**
- **Particulate and solid suspension or steam and air injection**
- **Homogenizing tank contents and proper chemical/biological reactions when pumping/draining**
- **Open tank heating for cooking grains, mash, starch, heating, as well as circulating and mixing**
- **Plating, phosphating, paint, anodizing, agricultural fertilizers and chemicals, pulp, slurries, electrocoating, and pretreatment**

LIGHTWEIGHT AND INEXPENSIVE SOLUTION TO TRADITIONAL MECHANICAL MIXING METHODS

DESIGN FEATURES

- **No moving parts**
- **Clog-resistant**
- **Minimal maintenance**
- **Volume of discharge liquid is 3-5 times greater than the motive liquid pumped**



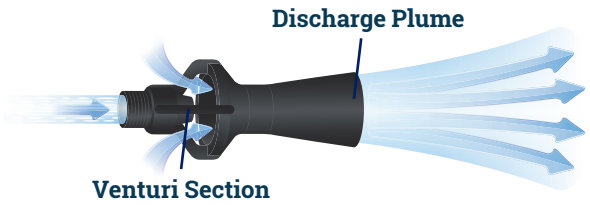
HOW THE TURBOMIX WORKS

The TurboMix eductor mixing nozzle is completely submerged below the liquid inside the tank and operates based on the simple premise that when velocity increases, pressure decreases. They are designed to take the velocity of the fluid pumped into the nozzle and convert it into a low-pressure zone that induces surrounding liquid in the tank to enter the nozzle. In this fashion, the pumped fluid is effectively mixed with the tank contents, and the amount of fluid that exits the nozzle is three to five times the amount of fluid pumped. This multiplier effect allows greater mixing efficiency while using a smaller pumping capacity.

Even after liquids are combined, mixing nozzles can agitate the combined fluid. For instance, if the mixture has many lighter or heavier solids than the liquid, agitation prevents them from floating or settling. The same is true for liquids of two different densities or oil and water-based compounds mixtures. Uniform liquids can stagnate, fostering bacteria growth and stratifying by temperature. Agitating keeps the solids suspended evenly while also preventing bacterial growth via mixing.

DISCHARGE PLUME

The plume is cone-shaped, diverging from the TurboMix at an angle of approximately 11º. To determine the approximate length of the discharge plume, multiply the pressure drop across the TurboMix in PSI (kPa/23) x 1 foot (1 meter). Reduce this estimate by 50% when sweeping solids across a tank bottom.



MATERIALS

The TurboMix is available in a wide variety of materials to suit any application. For excellent corrosion resistance choose glass-filled polypropylene. Where metal alloy material is required, choose from brass, carbon steel, and 316 stainless steel. Other materials are also available upon request.

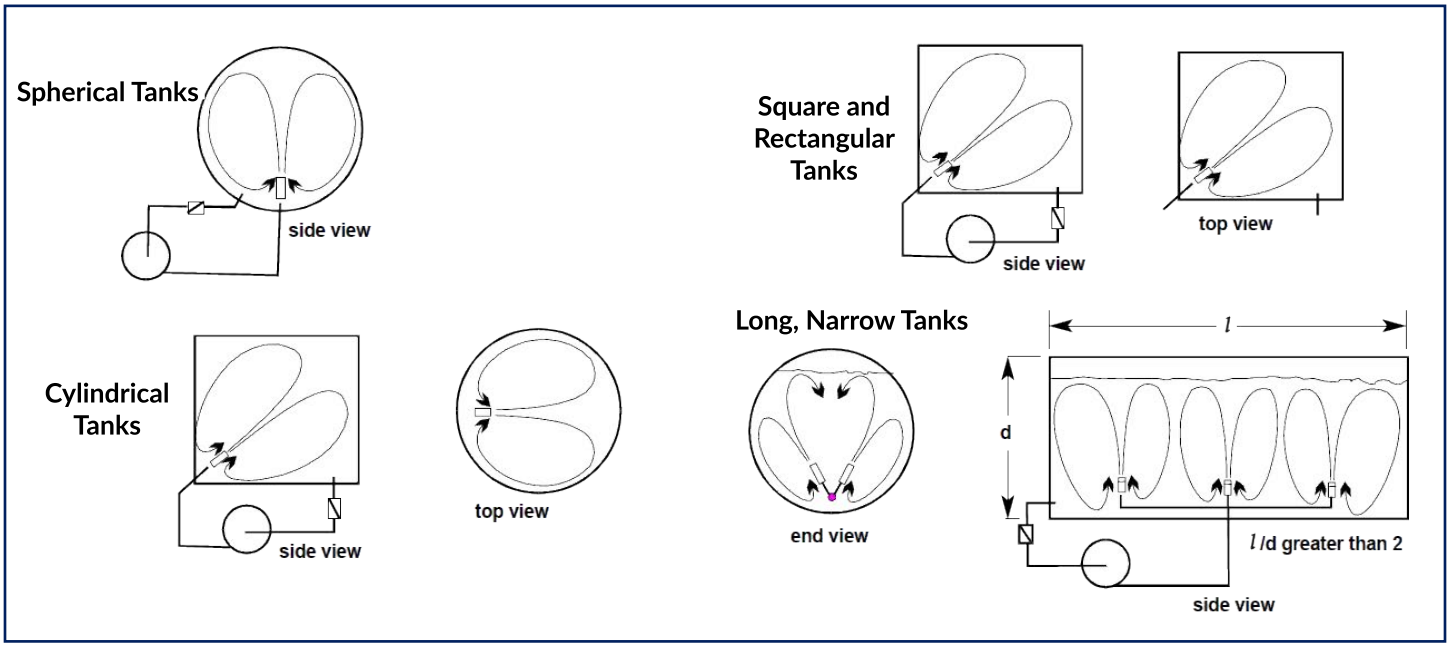
The approximate temperature limits of various materials are: glass-filled polypropylene 170ºF (77ºC), brass 755ºF (402ºC), carbon steel 450ºF (232ºC) and 316 stainless steel 800ºF (427ºC).

POSITIONING THE TURBOMIX

To agitate liquids or liquids with suspended solids, position the TurboMix at the bottom of one side of the tank and direct the plume upward toward the opposite side of the tank, aiming at the highest liquid level. To sweep solids along the tank bottom, direct the TurboMix plume downward at a 10º-20º angle, using enough units to cover the bottom surface completely. For some applications, directing the plume toward the pump inlet is useful.

BETE swivel joints may be used to aim the TurboMix more accurately. Refer to the chart below for placement suggestions in various tank shapes.

EDUCTOR PLACEMENT AND ELEVATION VIEWS FOR SPHERICAL, CYLINDRICAL, AND SQUARE TANKS



TurboMix®

TurboMix® Eductor Mixing Nozzle

Metal

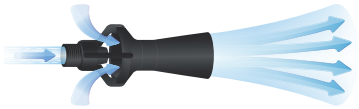
DESIGN FEATURES

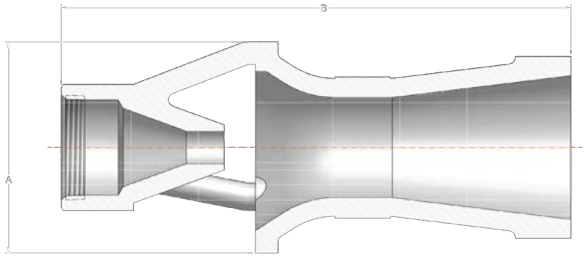
- Effective, economical way to circulate liquids in closed or open tanks
- No moving parts
- Inherently clog resistant
- Requires minimal maintenance
- Nozzle operation creates multiplying effect on fluid flow
- The volume of discharge liquid will be 3-5 times greater than the motive liquid pumped

SPRAY CHARACTERISTICS

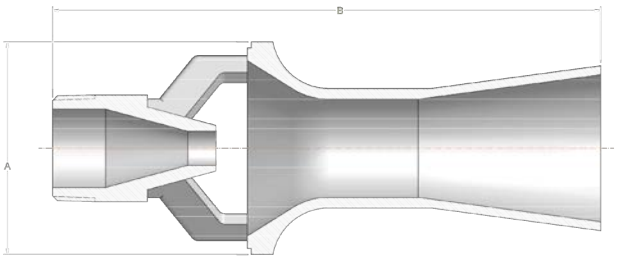
- Cone-shaped plume

Flow rates: 7 to 3180 gpm (motive)





Metal



Plastic

TURBOMIX® FLOW RATES & DIMENSIONS

TurboMix in Molded Plastic

NPT or BSP Connection Size		TurboMix Number	K Factor	Motive Flow Rate (gpm) @ Differential Pressure (psi)							Dimensions (in.)		Wt. (lbs.)
				10 psi	15 psi	20 psi	25 psi	30 psi	40 psi	50 psi	A	B	
Male	3/8"	TM73	2.3	7.3	8.9	10.3	11.5	12.6	14.6	16.3	2.13	4.5	0.06
	1/2"	TM120	3.38	10.7	13.1	15.1	16.9	18.5	21.4	23.9	2.5	6.5	0.08
	3/4"	TM137	4.3	13.7	16.8	19.4	21.7	23.7	27.4	30.6	2.88	6.38	0.14
	1"	TM240	7.6	24	29.4	33.9	37.9	41.6	48	53.7	3.5	9.5	0.32
	1 1/2"	TM340	10.8	34	41.6	48.1	53.8	58.9	68.3	76.4	4.5	9.75	0.46

Standard Material: Glass-filled Polypropylene. *PSI = supply pressure at the TurboMix minus the pressure in the tank

TurboMix in Metal

NPT or BSP Connection Size		TurboMix Number	K Factor	Motive Flow Rate (gpm) @ Differential Pressure (psi)							Dimensions (in.)		Wt. (lbs.)
				10 psi	20 psi	30 psi	40 psi	60 psi	80 psi	100 psi	A	B	
Male	3/8"	TM70	2.2	7	9.8	12.1	13.9	17.1	19.8	22.1	1.69	4.25	0.50
	1/2"	TM110	3.5	11	15.6	19.1	22	26.9	31.1	34.8	2.16	5.25	0.75
	3/4"	TM150	4.7	15	21.2	25.7	29.7	36.7	42.4	47.4	2.63	6.25	1.50
	1"	TM230	7.3	23	32.5	39.8	46	56.3	65.1	72.7	3.25	7.88	2.75
Female	1 1/2"	TM320	10.1	32	45.3	55.4	63.9	78.4	90.5	101	3.81	9.19	6.50
	2"	TM620	19.6	62	87.7	107	124	152	175	196	4.75	11.25	12.5
	3"	TM1500	47.4	150	212	260	300	367	424	474	5.75	19.38	40.0
150# Flange	4"	TM2510	79.4	251	355	435	502	615	710	794	9.00	34	40.0
	6"	TM6010	190	601	850	1040	1200	1470	1700	1900	12.63	52	120
	8"	TM10050	318	1005	1420	1740	2010	2460	2840	3180	16.38	68	325

Standard Materials: Brass (3" and smaller), Carbon Steel, 316 Stainless Steel.

Flow Rate (GPM) = $K\sqrt{PSI}$ *PSI = supply pressure at the TurboMix minus the pressure in the tank

Spray angle performance varies with pressure. Contact BETE for specific data on critical applications.