Using Jerguson®/Jacoby-Tarbox®(JRG/JT) Tank Mixing Eductors

TLA = Tank Liquid Agitator
Sizes Range from 3/8" to 24"+

Sizes as Small as 3/8"

Standard Plastic Materials include PPL & PVDF

Eductor with Tungsten Carbide Cladding

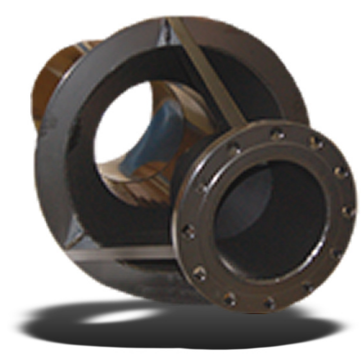
Nozzle Providing the Best Material Entrainment.

3-Thin Ribs Providing Optimal Flow Intake.

Longer Parallel Section Provides Superior Mixing.

Standard Materials include 316SS, Carbon Steel & Bronze

Other Materials are Available as Special Orders



Tank Eductors with Edathon Fluoropolymer Coating

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TANK MIXING EDUCTORS

3 Web Body-Nozzle Provides Maximum Spacing for Superior Suction Flow
Superior Performance comes from a Superior Design - Up to 5 to 1 Entrainment. We have No-Equal!
Now Available with Edathon coating, the strongest of all the fluoropolymers!

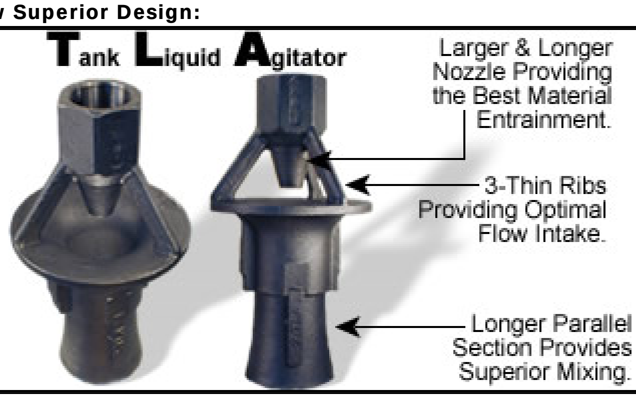
Tank Eductors are designed for "in-tank"applications. The TLA operates on the principle of flow dynamics pressurized fluid is accelerated through the nozzle to become a high velocity stream that entrains tank contents and intimately mixes with them. This combined stream exits the TLA at a high velocity creating a flow field capable of causing additional agitation and mixing the tank contents.

The tank eductor's motive fluid may come from two sources. The tank liquid may be recirculated through the eductor via an external pump or a secondary fluid may be introduced into the tank. Gases, as well as liquids, are used as the secondary fluid. Aeration and gas dispersion for chemical reactions are- common uses of gas motive systems. Liquids are typically additives to be mixed with or to dilute the tank contents. TLA's are often used in heating applications where the motive fluid is generally steam.

Tank Eductor (TLA) Features:

- Computer optimized flow paths enable the JRG/JT TLA to maintain a high "pick-up ratio" (the ratio of fluid entrained to the motive fluid) while maximizing the hydraulic efficiency (the ratio of hydraulic power at the outlet of the TLA to the hydraulic power at the inlet) to generate an optimum flow field from the greatest flow amplification.
- No moving parts in the eductor, minimizing maintenance expenses.
- Optimum flow field enables more activity within the tank than competitive units without changing pumps.
- Compact design and ease of mounting keeps the TLA from interfering with other tank equipment.
- "In-tank" mounting eliminates need for costly, complex mounting structures above tanks.
- The TLA can be used in a wide variety of open vessels or closed tanks.
- Eliminates stratification and promotes a homogenous tank with relation to pH, temperature, solids or gas dispersion, and distribution of chemicals.
- Produces a unique agitation not available with other types of mixers, as the TLA can generate a directed flow field within the fluid being mixed including viscous fluids, slurries, and suspensions.
- Easily mixes liquids of differing specific gravities and is excellent for scrubbing applications where a lower specific gravity fluid is driven into the higher one.
- Flow amplification due to high "pick-up ratio" and hydraulic efficiency permits the use of smaller pumps, which translates to reduced costs of mixing or agitation.
- Reduces investment cost because existing transfer pumps can be utilized for more than one purpose.

New Superior Design:



Get Superior Protection with our Optional Edathon Coating

- Excellent Corrosion Resistance
- Excellent Abrasion Resistance
- 300° F Continuous Service
- Good Non-Stick Characteristics
- Excellent Dielectric Insulation
- Radiation Resistant

This coating is applied via electrostatic powder spray or fluidized powder bed. In addition to possessing the high chemical and temperature resistance which all fluoropolymers are noted for, Edathon's strengths, radiation resistance, wear resistance, and creep resistance are significantly greater than those of other fluoropolymers such as PTFE, FEP, or PFA.

Calculating Turnover Rates

When turnover rates are used to calculate mixing, it is important to consider the viscosity of the fluid and the amounts of solids present, the size and weight of the shapes of tanks which limit the free flow of the mixing solids to maintain suspension, the viscosity or odd flow field within the tank, and suspensions that separate easily and demand constant mixing. In most cases, the TLA will usually provide a homogenous mixture of the vessel in one to three turnovers.

When operated with pressure drops between 10 and 60 PSI, the TLA will entrain at least 4 times as much tank liquid as the motive liquid used. For pressure drops over 60 PSI, the amount of fluid entrained by the TLA remains almost constant.
Up to 5 to 1 Entrainment

To calculate the required turnover time for the tank with pressure drops between 10 and 60 PSI, divide the tank volume by the result of the number of eductors times the outlet flow (GPM).

Determining Effective Flow Fields for Mixing In Tanks

To properly size a TLA eductor for mixing a tank, the effective length of the flow field must be determined. The amount of power put into the tank varies based on the mass flow rate of the motivating fluid in the eductor and the pressure of the fluid as it enters the system.

For vessels mixed at an angle, the distance the eductor is actually seeing must be calculated. For example, if the eductor is angled upward, the distance is the hypotenuse of the triangle made up of the length and the height of the tank.

Refer to the "Max Length" listed in the chart below for determining the normal effective plume length of the TLA eductor. At this length, the minimum velocity centerline within the flow field is normally one foot per second. Beyond this length, the lower velocities may have limited effect on the tank contents.

TLA Agitation / Mixing Performance Chart

Size IPS		Pressure Difference, PSI											
		10	20	30	40	50	60	70	80	90	100	120	140
	Motive Flow (GPM)	7.1	10.0	12.3	14.2	15.8	17.4	18.7	20.1	21.3	22.4	24.6	26.5
3/8 "	Outlet Flow (GPM)	35	50	61	71	79	87	88	90	91	92	94	96
	Max. Plume Length	4	8	12	16	22	29	36	43	50	58	72	86
3/4 "	Motive Flow (GPM)	15.4	21.8	26.7	30.8	34.5	37.8	40.8	43.6	46.3	48.8	53.4	57.7
	Outlet Flow (GPM)	77	109	134	154	172	189	192	195	197	200	204	209
	Max. Plume Length	5	11	17	24	33	42	53	64	74	85	106	127
	Motive Flow (GPM)	30.8	43.6	53.4	61.6	68.9	75.5	81.5	87.2	92.5	97.5	107	115
1-1/2 "	Outlet Flow (GPM)	154	218	267	306	345	378	384	389	395	400	409	417
	Max. Plume Length	7.5	16	24	34	46	60	75	90	105	120	150	180
2 "	Motive Flow (GPM)	61.6	87.2	107	123	138	151	163	174	185	195	214	231
	Outlet Flow (GPM)	308	436	534	616	689	755	767	778	789	799	818	835
	Max. Plume Length	11	23	34	48	65	85	106	12	148	170	212	255
	Motive Flow (GPM)	142	201	246	283	317	347	375	401	426	449	491	531
3 "	Outlet Flow (GPM)	708	1,003	1,228	1,417	1,585	1,737	1,764	1,790	1,815	1,836	1,880	1,920
	Max. Plume Length	16	34	51	73	99	129	161	193	225	257	322	386

**** Pressure is in PSI and Plume Length shown in Feet**

TANK HEATING EDUCTORS (ALSO KNOWN AS SPARGER NOZZLES)

There are many advantages to using eductors for heating liquids in open vessels. These give the vessel heating eductor a place as a viable option for heating in many types of vessels.

The tank eductor heater provides direct contact of the steam into the liquid. This assures complete transfer of the energy in the steam into the liquid being heated. Other types of heating lose efficiency as the interior of the heat exchanger builds up a scale. With eductors, the velocity of the steam being injected into the vessel also causes the liquid contents of the vessel to be agitated while heating occurs, without the need for other types of mixers in the vessel. This provides for more even heating of the vessel contents. They also permit the steam to be dispersed over more of the liquid volume, resulting in a more homogenous heating than with other methods of injecting steam.

These designs of eductors allow steam to be used from 10 to 140 PSIG for heating. Because of the nature of direct steam injection, heating vessels at atmospheric pressure beyond 140° F should not be attempted. Exceeding this temperature could result in uncondensed steam evolving from the liquid.

Sg = Specific gravity of tank liquid

Sh = Specific heat of tank liquid

How to Size Tank Eductors for Heating Vessels

Information needed to size includes the following:

What is the tank liquid? (If it is not water (Sg =1.0, Sh =1.0), contact us.)

What temperature rise (AT) is needed?

What is the final tank temperature?

What is the vessel capacity?

Time available to heat the vessel (t)?

Steam pressure available?

Step 1 To determine the amount of steam required to heat the liquid in the vessel, multiply the gallons in the vessel to be heated x 8.33 x Sg x Sh x temperature rise ΔT desired, divided by 1100 (BTUs per Lb steam). **Lb steam required (Wm) = Gal x 8.33 x Sg x Sh x ΔT/1100**

Step 2 To calculate the flow of steam required per minute, divide the steam flow from Step 1 by the time you need to complete the heating process. **Lb steam per minute (Qm)= Wm/minutes (t)**

Step 3 If multiple units are going to be used, divide the number from Step 2 by the number of units to be used.

Step 4 Go to the TLA Steam Flow table. Find the amount of steam flow Qm (Lb/Min) at the steam pressure available. This is the steam flow for a 1-1/2" unit. Take the steam flow obtained in Step 3 divided by the steam flow from the Steam Flow table. This will give the Sizing Factor (S.F.) needed to heat the vessel in the time required.

S.F. = Desired Steam Flowrate/ Saturated Steam Flowrate

Step 5 Choose the eductor size that has at meets or exceeds the number determined in Step 4

Example:

- The liquid in the vessel is Water (Sg =1.0)
- The temperature rise desired is ΔT = 50°F
- The final tank temperature is 120°F
- The vessel holds 550 gallons
- The time to heat it is 20 minutes
- Steam is available at 40 psig
- Use two model TLAs

Step 1 Wm = 550 x 8.33 x 1.0 x 50/1100 = 208 Lb of steam required

Step 2 Qm = Lb steam per minute = 208/20 = 10.4 Lb steam per minute

Step 3 Are multiple units going to be used? If so how many? In this case, we will use two eductors. 10.4 Lb steam per minute/2 = 5.2 Lb/min per eductor

Step 4 S.F. = 5.2/13.4 = .39 desired S.F.

Step 5 Choose the model TLA 3/4" with a S.F. of .50 as this is the smallest unit that meets or exceeds the desired S.F.

Calculating Actual Performance

Qm per unit = 13.4 x.50 = 6.7 Lb/Min
Qm for installation = 6.7 x 2 =13.4 Lb/Min
Time to heat tank = 208 Lb (Step 1)/13.4 = 15.5 minutes

If two TLAs (3/4" size) are installed and operated at 40 psig of steam pressure, they will heat the liquid in 15.5 minutes.

TLA **Steam Flow, Qm (lb/Min)** **1-1/2" Unit**

	10	**20**	**40**	**60**	**80**	**100**	**120**	**140**
Steam Flow, Qm (lb/Min)	6.4	8.8	13.4	18.3	22.8	27.4	31.9	36.5

TLA Heater Performance Chart - Volume of Liquid Heated Per Minute, Qm (GPM)

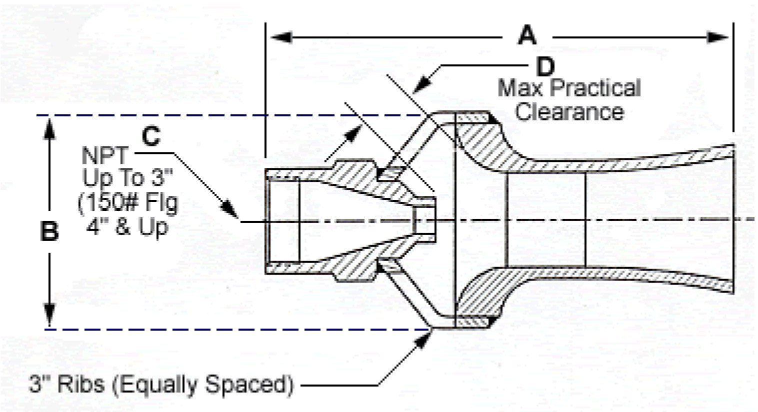
Size	ΔT*	10 PSIG	20 PSIG	40 PSIG	60 PSIG	80 PSIG	100 PSIG	120 PSIG	140 PSIG
	25	8.5	11.6	17.7	24.2	30.1	36.2	42.1	48.2
	50	4.2	5.8	8.8	12.1	15.1	18.1	21.1	24.1
3/8"	75	2.8	3.9	5.9	8.1	10.0	12.1	14.0	16.1
	100	2.1	2.9	4.4	6.0	7.5	9.0	10.5	12.0
	125	1.7	2.3	3.5	4.8	6.0	7.2	8.4	9.6
	25	16.9	23.2	35.4	48.3	60.2	72.4	84.2	96.4
	50	8.5	11.6	17.7	24.2	30.1	36.2	42.1	48.2
3/4"	75	5.6	7.7	11,8	16.1	20.1	24.1	28.1	32.1
	100	4.2	5.8	8.8	12.1	15.1	18.1	21.1	24.1
	125	3.4	4.6	7.1	9.7	12.0	14.5	16.8	19.3
	25	33.8	46.5	70.8	96.7	120.4	144.7	168.5	192.8
	50	16.9	23.2	35.4	48.3	60.2	72.4	84.2	96.4
1-1/2"	75	11.3	15.5	23.6	32.2	40.1	48.2	56.2	64.3
	100	8.5	11.6	17.7	24.2	30.1	36.2	42.1	48.2
	125	6.8	9.3	14.2	19.3	24.1	28.9	33.7	38.6
	25	67.6	93.0	141.6	193.3	240.9	289.5	337.0	385.6
	50	33.8	46.5	70.8	96.7	120.4	144.7	168.5	192.8
2"	75	22.5	31.0	47.2	64.4	80.3	96.5	112.3	128.5
	100	16.9	23.2	35.4	48.3	60.2	72.4	84.2	96.4
	125	13.5	18.6	28.3	38.7	48.2	57.9	67.4	77.1
	25	155.5	213.8	325.6	444.6	554.0	665.8	775.1	886.9
	50	77.8	106.9	162.8	222.3	277.0	332.9	387.5	443.4
3"	75	51.8	71.3	108.5	148.2	184.7	221.9	258.4	295.6
	100	38.9	53.5	81.4	111.2	138.5	166.4	193.8	221.7
	125	31.1	42.8	65.1	88.9	110.8	133.2	155.0	177.4
**4" ** **									
**6" ** **									
**8" ** **									
**10" ** **									

***ΔT** = Temperature Rise
** Figures can be provided upon request.

SPECIFICATIONS

Standard materials TLA's are cast or fabricated in: bronze, 316 stainless and carbon steel. Cast units range from IPS 3/4 to 2. Larger sizes and other materials are fabricated. Consult the factory for details.

Standard body connection for 3/8 and 3/4 units is male NPT and for 1-1/2 through 3, female NPT. Optional connections include female/male NPT, butt weld, socket weld, VictualicTm, sil-braze, and flanged.



Size	Dimension A		Dimension B		Dimension C		Dimension D	
	IN	(mm)	IN	(mm)	IPS	(mm)	IN	(mm)
3/8"	5.00	(127)	2.50	(64)	3/8 MNPT	(10)	.50	(12)
3/4"	7.25	(184)	3.69	(94)	3/4 MNPT	(20)	.81	(20)
1-1/2"	10.88	(276)	5.50	(140)	1-1/2 FNPT	(40)	1.12	(28)
2"	14.50	(368)	7.69	(195)	2 FNPT	(50)	1.62	(41)
3"	22.00	(559)	11.75	(298)	3 FNPT	(80)	2.50	(63)
4"	25.00	(635)	12.00	(305)	4 FNPT	(100)	3.00	(76)
6"	35.00	(889)	25.00	(635)	6 FNPT	(150)	4.50	(114)
8"	Dimensions Provided Upon Request							
10"	Dimensions Provided Upon Request							

Specifications:

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Standard body connection for 3/8 and 3/4 units is male NPT and for 1-1/2 through 3, female NPT. Over 4" is flanged. Optional connections include female/male NPT, butt weld, socket weld, VictualicTm, sil-braze, and flanged.

Standard Materials:

- Carbon Steel
- 316SS
- Bronze
- PVC
- PPL
- PVDF