Tank Mixing Eductors.

Material : **Polypropylene.** **

Inlet Conn. (in.): 1/4, 3/8, ½, ¾, 1 and 1-1/2 BSPT (M)

Effective Flow Field: 3’ to 46’ of flow per second
(.91 to 14 m of flow per second)

Dimensions: 3” to 10” length (81 to 250mm);
1-1/4” to 3-3/4” (33 to 95 mm) outside diameter.

*Maximum operating temperature with water is 220°F (104°C) at 50 psi (3.5 bar)
** Maximum operating temperature with water is 200°F (93°C) at 50 psi (3.5 bar)

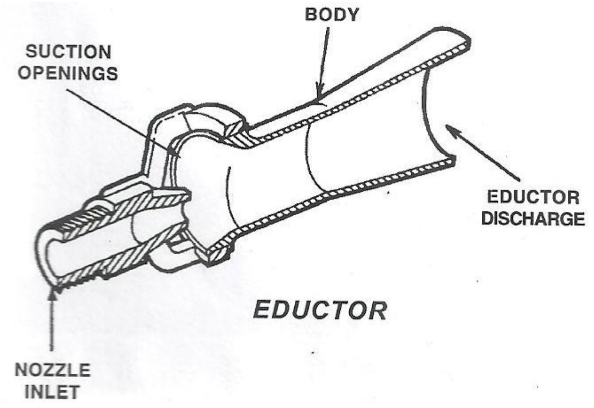
FEATURES AND SPECIFICATIONS

Eductors are designed for in-tank mixing of liquids using a liquid as the motive fluid.

Mixing is accomplished first within the eductor as the motive liquid entrains the tank contents into the suction openings, and thoroughly mixes within the unit before being discharged. The discharge flow, or plume, provides further mixing and agitation within the tank. The motive liquid can be drawn from the tank, or it can be a second liquid drawn from another source. For each gallon of motive liquid, 5 gallons are discharges in an 11° plume.

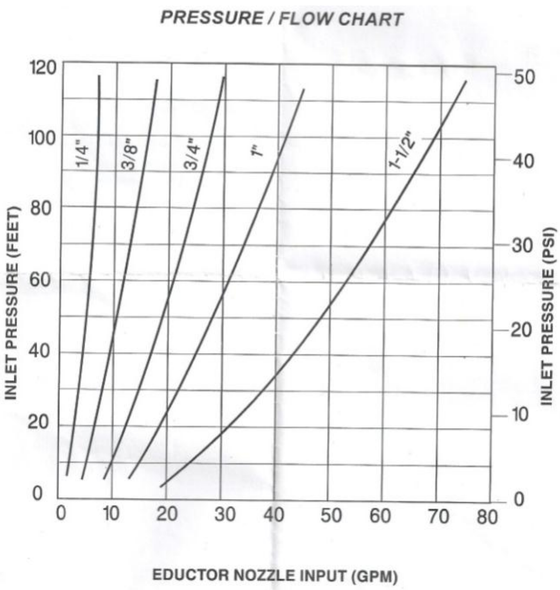
For Mixing:
Minimum inlet pressure – 10 PSIG
Maximum inlet pressure – 100 PSIG

Most efficient operation takes place when inlet pressure is within the range of 20 to 70 PSIG.



TURNOVER RATE

The rate at which fluid in the tank must be completely turned over will determine the overall capacity of the eductor(s) needed. When the inlet pressure supplied to the eductor is within a range of 10 to 70 PSI (133 to 483 kPa), four gallons of tank contents can be mixed for every gallon of operating fluid passing through the eductor. That is, the volume of fluid discharged from the eductor will be five times greater than the volume of operating fluid entering the eductor inlet. See chart,



NOTE: Eductor inlet pressure will be where pump flow curve intersects eductor flow curve. Multiply corresponding nozzle input by 5 to arrive at eductor discharge (agitation) flow.

BENEFITS

- Entrains four times more solution than pumped solution
- Large flow opening allows particulates to pass through with minimal clogging
- Flow chamber design eliminates internal material build-up
- Compact design minimizes interference with plating racks and other in-tank equipment
- In-tank mounting design eliminates the need for above tank mounting devices
- Ideal for use in anodizing, cleaning, electroplating, mixing, paint booth, phosphating, plating, rinsing and stripping applications

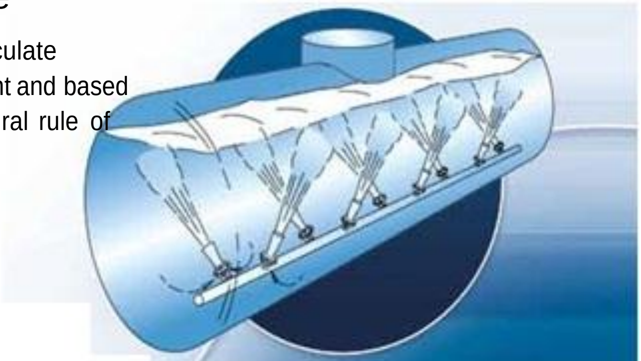
Guideline for Specifying Tank Mixing Eductors

1. Start by determining the needed turnover rate

How many times per hour does the tank solution need to circulate through the eductors? The answer is application- dependent and based on solution viscosity and the number of particulates. A general rule of thumb is 20 turnovers per hour

Here are some typical guidelines:

- **Plating and rinsing tanks:** 10 to 20 turnovers per hour although some plating tanks may require more than30 turnovers per hour
- **Cleaning tanks:** at least 10 turnovers per hour
- **Heavily soiled tanks:** up to 20 turnovers per hour
- **Critical cleaning tanks:** more than 20 turnovers per hour



Mixing in Elongated Tanks

2. Then calculate the needed flow rate

Multiply the appropriate turnover rate by the tank volume and then divide by 60

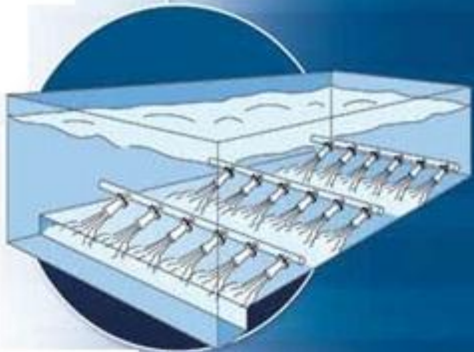
Example:

10 X 800 (3028.3) = 8,000 gph (30,283 l/hr)

turnover rate per hour

tank volume in gallons (liters)

8,000 gph ÷ 60 = **133.3 gpm**
(30,283 l/hr) **(504.7 l/min)**



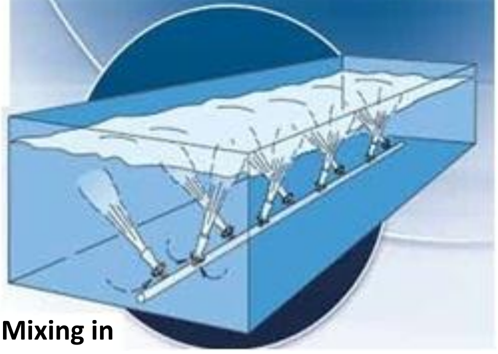
Directional Sweeping in Electrocoat Tanks

3. Determine the needed inlet flow rate

Take the gallons (liters) per minute and divide by 5 since the eductors mix at a 5:1 ratio

Example:

133.3 ÷ 5 = **26.7 gpm**
(504.7 ÷ 5 = **100.9 l/min**)

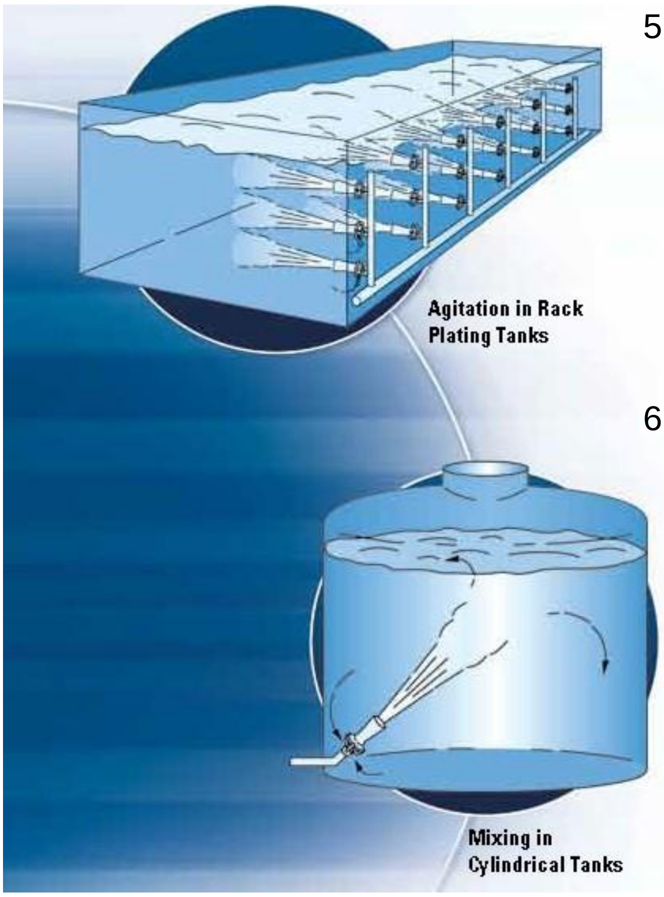


Mixing in Stratified Lavers Tanks

4. Determine the eductor size needed by consulting the performance table

Example: One 3/4" eductor will produce a flow rate of 27 gpm at 40 psi (1061/min at 3 bar). If multiple eductors are to be used due to the configuration of the tank, take the needed inlet flow rate and divide by the flow rate of the eductors. In this case, using four, 1/4"eductors will provide a liquid flow rate of 28 gpm at 40 psi (121 l/min at 3 bar)

Note : These charts are for theoretical calculations only.



5. Determine how many eductors you need

- You may need to use multiple eductors to obtain the needed flow rate
- You may want to use multiple eductors to prevent stagnation which is a common problem in square and rectangular tanks
- In general, using multiple eductors in larger tanks will provide more effective mixing than one centrally located eductor

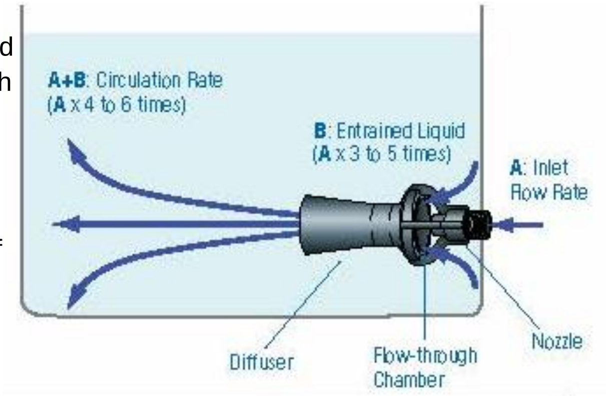
6. Determine

- Little agitation occurs below the level of the eductor, so eductors should be positioned as close as possible to the bottom of the tank for maximum liquid turnover
- If settling cannot be tolerated, install the eductors at 1' (.3m) above the bottom of the tank
- In general, eductors should be placed so the flow field will reach the farthest and highest liquid level at the opposite side of the tank
- Typical eductor configurations for various types of the tank and applications are shown t the left. Mounting adapters are available to direct flow as needed. Be sure to consult with your nozzle manufacturer to ensure optimal placement
- Typically, eductors are placed 12" (.3m) apart for even and uniform agitation

Tank Mixing Eductor Operating

Pressurized liquid is pumped into the eductor. As the liquid exits at high velocity, it draws surrounding solution through the eductor's flow-through chamber. The additional liquid flow mixes with the pumped solution and multiples its volume.

Eductors can entrain up to five times the amount of pumped solution depending on the eductor size and design.

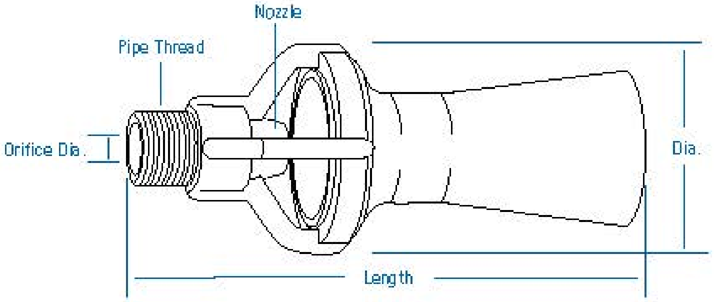


Note : These charts are for theoretical calculations only.

Performance Data

Size	Flow Rate	Inlet Liquid Pressure psi (bar)							
		10 (.5)	15 (1)	20 (1.5)	25 (2)	30 (2.5)	35 (3)	40 (3.5)	45 (4.0)
1/4	Inlet Flow Rate gpm (l/min)	3.5 (11.3)	4.3 (16.0)	5.0 (19.5)	5.5 (23)	6.1 (25)	6.6 (28)	7.0 (30)	7.8 (32)
	Circulation /Rate gpm (l/min)	16.2 (53.3)	19.4 (75)	22.8 (91.5)	25.1 (107)	28.1 (118)	30.6 (130)	33 (140)	36.8 (150)
	Effective Flow Field ft. (m)	3.0 (.91)	5.0 (1.5)	7.0 (2.1)	8.5 (2.6)	10.0 (3.0)	12.0 (3.7)	14.0 (4.3)	17.0 (5.2)
3/8	Inlet Flow Rate gpm (l/min)	9.0 (29)	11.0 (42)	12.5 (51)	14.0 (59)	16.0 (65)	17.0 (70)	18.0 (77)	20 (82)
	Circulation /Rate gpm (l/min)	45 (145)	55 (210)	62.5 (255)	70 (295)	80 (325)	85 (350)	90 (385)	100 (410)
	Effective Flow Field ft. (m)	4.0 (1.2)	6.0 (1.8)	8.0 (2.4)	10.0 (3.0)	12.0 (3.7)	14.0 (4.3)	16.0 (4.9)	22 (6.7)
3/4	Inlet Flow Rate gpm (l/min)	13.5 (43)	17.0 (64)	19.0 (74)	21 (85)	23 (97)	25 (106)	27 (116)	30 (124)
	Circulation /Rate gpm (l/min)	67.5 (215)	85 (320)	95 (370)	105 (425)	115 (485)	125 (530)	135 (580)	150 (620)
	Effective Flow Field ft. (m)	5.0 (1.5)	8.0 (2.4)	11.0 (3.4)	14.0 (4.3)	17.0 (5.2)	20 (6.1)	24 (7.3)	33 (10.1)
1.1/2	Inlet Flow Rate gpm (l/min)	33 (106)	40 (151)	47 (184)	53 (215)	58 (243)	63 (259)	66 (288)	75 (308)
	Circulation /Rate gpm (l/min)	165 (530)	200 (755)	235 (920)	265 (1075)	290 (1215)	315 (1295)	330 (1440)	375 (1540)
	Effective Flow Field ft. (m)	7.5 (2.3)	12.0 (3.7)	16.0 (4.9)	20 (6.1)	24 (7.3)	29 (8.8)	34 (10.4)	46 (14.0)

*Effective Flow Field is defined as 1’ (30 cm) of flow/second.



Dimensions :

Serial No.	Inlet Connection. BSPT (M)	**Orifice Dia. in. (mm)**	**Length in. (mm)**	**Dia. in. (mm)**	**Net Wieght oz. (kg)**
1.	**¼”**	06	81	33	.51(.01)
2.	**3/8”**	12	120	50	1(.03)
3.	**½”**	15	170	66	2.8(.08)
4.	**¾”**	18	170	66	2.9(.08)
5.	**1”**	23	99	57	1.1(.03)
6.	**1-1/2”**	35	250	95	10.2(.29)