EDUCTOR

NOZZLES, VENTURI AGITATION

- ELECTROPLATING
- PRINTED CIRCUIT BOARD (PCB)
- METAL FINISHING
- ACID PICKLING
- CHEMICAL ETCHING
- ALUMINIUM ANODIZING
- SALTS DISSOLUTION
- MIXING - HOMOGENEOUS SOLUTION

60 YEARS OF EXPERTISE

MADE IN FRANCE

EDUCTOR NOZZLES

VENTURI AGITATION

WORKING PRINCIPLE

The Siebec agitation system with eductor nozzle uses the Venturi principle in order to amplify the volume of liquid delivered by a pump.

Each eductor nozzle can deliver up to 5 times the volume of liquid pumped

Continous solution movement is more efficient than air agitation and enables an homegenous solution.

Eductor nozzles allow better fluid circulation in the tank which enables an enhanced control over the quality of depositon.

Venturi agitation delivers uniform bath temperature.

THE ESSENTIAL ROLE OF AGITATION SYSTEMS

AVANTAGES

Prevents laminating
Avoids stagnation in the tank and disperses products and reagents

Dissipate the heat
Dissipate the heat from the cathode/electrolyte interface.

Reduction of turbulences
Increases the deposition factor from 1 to

Venturi principle
Multiplies by 5 the volume of liquid pumped

Optimizes deposition properties
Porosity, hardness, resistant to wear and tear

MATÉRIAUX

Molded in one piece
In polypropylene, PVDF or Stainless steel

APPLICATIONS

Suitable for most applications
Electroplating, degreasing, cleaning, pickling, pre-treatment, paint stripping, anodizing, homogenous solution, mixing, chemical make up

OPTION

Eductor nozzle carrier
Easy installation, reinforced rigidity, PP, PVC, PVDF

EDUCTOR NOZZLES

ADVANTAGES

ELECTROPLATING / PRINTED CIRCUIT PLATING

Nickel - Copper - Zinc - Chrome - Gold - Silver & many other chemicals processes

90 % LESS TOXIC FUMES

Reduced need for extraction and washing of gases to conform to standards

HOMOGENEIZATION

Bath is more homogeneous in both temperature and concentration, in a way that is superior to air or mechanical agitation

ENHANCED CONDUCTIVITY

Reduction of electrical resistance thanks to the absence of air, preventing the loss of conductivity in the solution.

HEATING SAVINGS

Savings on the energy needed to heat the bath (air is responsible for about 25% of energetic losses) thanks to heat losses almost null because of the absence of emanations

IMPROVED WORKING ENVIRONMENT

Reduction of risks for operators and the surroundings

ALUMINUM ANODIZATION

LESS DEFECTS

No external air added which enables a better control over the process.
No carbon dioxide dissolution from air = no air bubble retention in the hollow pieces + no formation of carbonates

REDUCED COOLING COSTS

Thanks to a uniform distribution of the temperature

METAL FINISHING

Alkaline cleaners - Phosphate tank - Paint stripper

LESS FILTRATION

Preservation of brighteners and components of the bath. Reduces the consumption of plating additives and sludge production

STEEL & AERONAUTICS

Acid pickling - Chemical Etching

LESS CLEANING

Reduction of equipments and infrastructures corrosion by eliminating air borne particles (unlike air agitation). Less cleaning needed around the tanks and electrical equipments

EDUCTOR NOZZLES

VENTURI AGITATION

A GOOD AGITATION IS LINKED TO THE FLOW VELOCITY GRADIENT AT THE EDUCTOR NOZZLE OUTLET

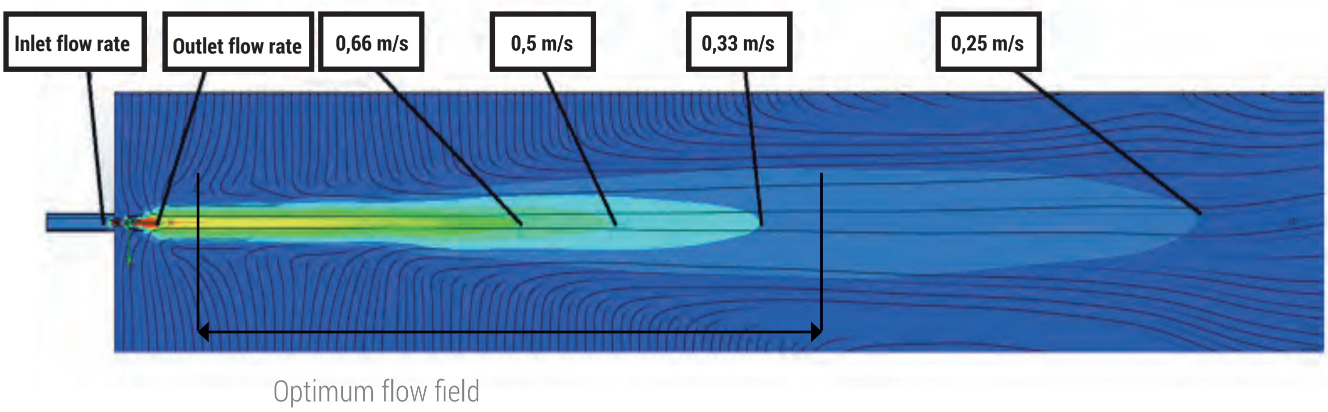
An efficient flow field for agitation in critical areas is defined by the minimum flow velocity going from 0,25 to 0,3 m/s depending on the application.
Mechanical agitation only reaches 0,15 m/s

PERFORMANCES

Eductor model	Flow rate	INLET PRESSURE (bar)								
		0.6	0.8	1	1.2	1.3	1.4	1.5	2	2.5
1/4”	Inlet airflow (m³/h)	0.75	0.85	0.94	1.03	1.07	1.1	1.18	-	-
	Outlet airflow (m³/h)	3.95	4.44	4.9	5.36	5.6	5.73	6.15	-	-
	Efficient flow field @ 0.33 m/s (m)	1.22	1.27	1.38	1.49	1.35	1.57	1.72	-	-
	Efficient flow field @ 0.25 m/s (m)	1.47	1.60	1.74	1.89	1.96	2.02	2.17	-	-
3/8”	Inlet airflow (m³/h)	1.30	1.74	1.8	2.0	2.07	2.14	2.2	2.55	2.77
	Outlet airflow (m³/h)	6.73	8.97	9.3	10.4	10.7	11.0	11.1	13.1	14.3
	Efficient flow field @ 0.33 m/s (m)	1.59	1.95	2.1	2.29	2.35	2.41	2.5	2.8	2.9
	Efficient flow field @ 0.25 m/s (m)	1.94	2.39	2.6	2.81	2.90	2.98	3.1	3.5	3.6
3/4”	Inlet airflow (m³/h)	2.71	3.42	3.6	3.95	4.11	4.26	4.4	5.1	5.6
	Outlet airflow (m³/h)	12.1	15.1	15.5	17.5	18.2	18.9	19.8	22.3	24.9
	Efficient flow field @ 0.33 m/s (m)	1.76	2.15	2.2	2.44	2.52	2.59	2.65	3	3.4
	Efficient flow field @ 0.25 m/s (m)	2.26	2.77	2.88	3.14	3.25	3.36	3.5	4	4.6

Simulation conditions : eductor nozzles in 20°C - 1cP water
Values vary depending on the characteristics of the bath and pressure losses of the system.

FLOW VELOCITY GRADIENT («FEATHER»)



EDUCTOR NOZZLES

VENTURI AGITATION

HOW TO CALCULATE AN EDUCTOR NOZZLE SYSTEI

1 THE NUMBER OF EDUCTOR NOZZLES

The number of eductor nozzles is determined by the total length of the tank and the typical recommanded spacing between eductors according to the table at the bottom of the page.

2 THE SIZE OF EDUCTOR NOZZLES

The size of eductor nozzles is determined by the size of the tank and the space avaible.
Tanks under 300L are often equiped with 1/4" eductor nozzles
Larger tanks are usually equiped with 3/8" eductor nozzles and deep tanks can be equiped with 3/4" eductor nozzles.

3 PIPING DESIGN

The design of the manifold must ensure good movement of solution within the bath and prevent direct impingment when electroplating. Stripping or cleaning aplications can handle stronger turbulences directed at the product being treated.

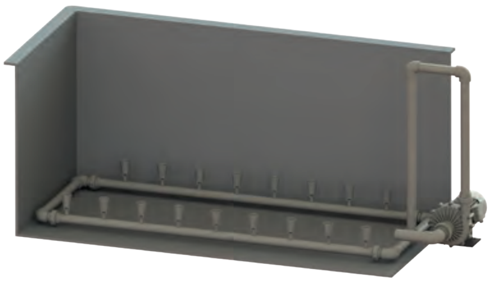
4 SIZE OF THE PUMP

The size of the pump is calculed depending on the number and size of the selected eductor nozzles, the depth of the tank, as well as the piping.

5 EDUCTOR CARRIER

Siebec designed PVC, PP, PVDF eductor carrier in order to ease the mounting of eductors on the manifold while enhancing the rigidity of the connection.
No need to tap the manifold, you can insert the carier simply by drilling. The carier is then welded by seam or socket

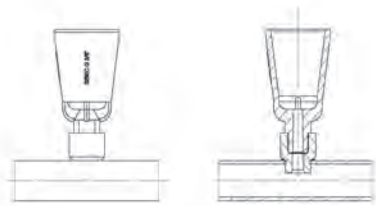
H LAYOUT



O LAYOUT

Modelling of eductor nozzles layout in a treatment bath

Eductor size	Recommanded center distance (mm)
1/4"	200
3/8"	300
3/4"	400



EDUCTOR CARRIER

EDUCTOR NOZZLES

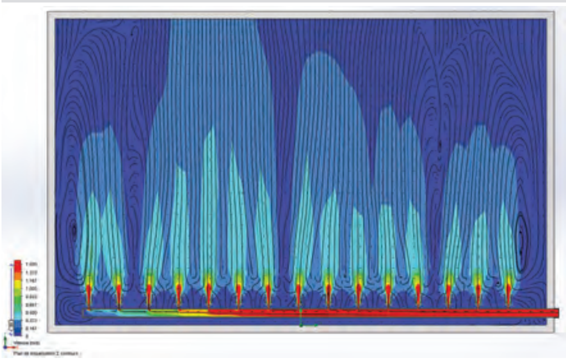
VENTURI AGITATION

OPTIMIZATION OF YOUR AGITATION SYSTEM

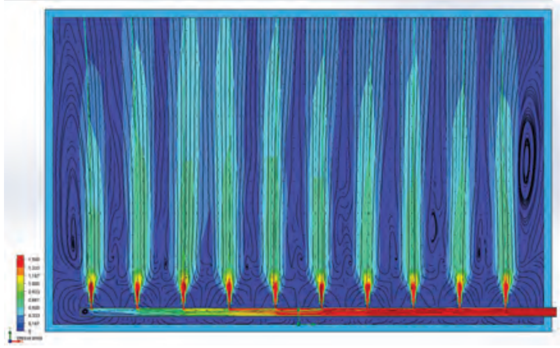
SIEBEC can help you in the calculation of the number and size of the eductor nozzles and design the installation of your agitation system.

Our flow simulation software allows us to reach an optimized agitation in your tank.

Before optimization



After optimization



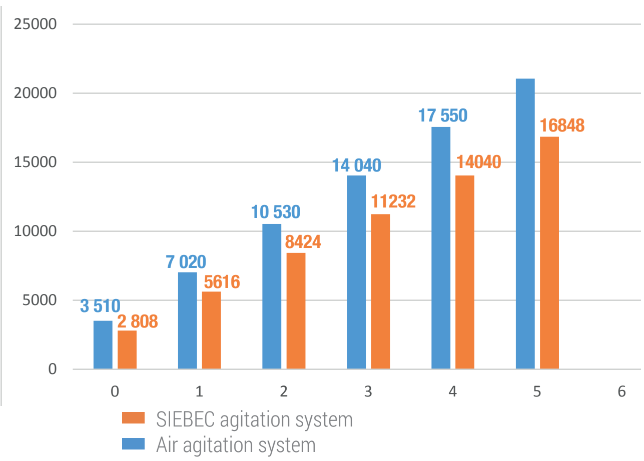
SIEBEC pump M390 | Height of the tank : 2 m | Eductor nozzle : 3/8"

EXAMPLE : SIMULATION OF SAVINGS

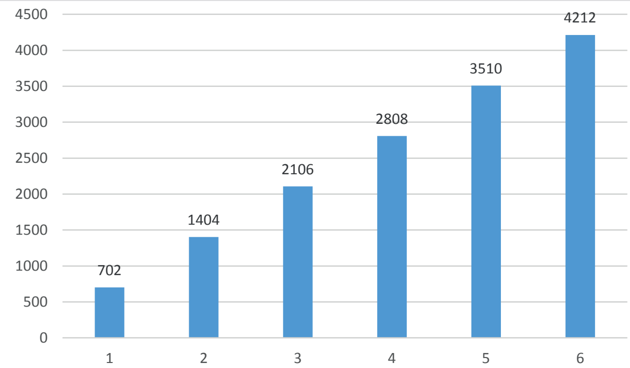
comparison between an air agitated system and Venturi agitation

Tank volume	Bath temperature	Air temperature	Power absorbed *Venturi agitation*	Power absorbed *Air agitation*
5m^3	60°C	20°C	12 kW	15 kW

ENERGETIC CONSUMPTION COMPARISON



SAVINGS*



*calculated on a basis of 52 weeks of 5 days (260 days), 10 h per day, 0.09€/kWh

-24 % EVAPORATION

20 % SAVINGS*

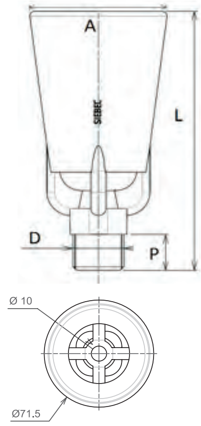
EDUCTOR NOZZLES

VENTURI AGITATION

FLOOR SPACE, DIMENSIONS, MATERIALS

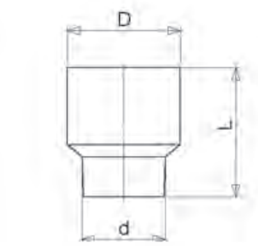
MODELE	MATERIAL*			DIMENSION (mm)			FLOW RATE (m³/h)
Ø D thread (Inch)	PP	PVDF	Stainless steel	Thread length L	Thread length P	Ø Outlet A	Outlet airflow
1/4”	•	•		72	11	26	3.1 to 6.15
3/8”	•	•	•	100	16	53	6.35 to 14.3
3/4”	•	•		144.5	20	71.3	11 to 27.45

** Polypropylene (Max temperature of the fluid : 80°C) - PVDF (Max temperature of the fluid: 110°C).*



EDUCTOR CARRIER SIZE

	L	D	d
1/4”	24	20	15
3/8”	32	28	20
3/4”	41	35	25



PUMPS FOR EDUCTOR NOZZLE AGITATION SYSTEM

MODELES	ENGINE POWER (kW)	MAX FLOW RATE (m3/h)	MAX TOTAL HEAD (m)
Magnetic drive pumps			
M200	1.1	20	19
M250	1.5	25	19
M290	2.2	29	21.5
M390	4.0	40	23
Mechanical seal pumps			
A27	2.2	30	25
A30	4	48	25
A31	5.5	52	32
A32	7.5	57	50
Vertical pumps (SIEBEC) – outside of tank or immersed			
T202	1.5	18	17
T242	1.5	23.5	17
T262HD	3	29	18,5
Vertical pumps (Bohncke GmbH) – immersed			
S17	3.0	25	32.5
S18	4.0	40	32.5

MAGNETIC DRIVE PUMPS
MECHANICAL SEAL PUMPS
VERTICAL PUMPS

SIEBEC - A30

BOHNCKE - S18

SIEBEC - M390

To know the complete specifications
(alternative constructions, air flow charts, dimensions, etc.)
CONTACT US !

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