PACIFIC WATER TECHNOLOGY

STATIC MIXERS

Experience the High Quality Static Mixers from Pacific Water Technology

Pacific Water Technology is the leader in high quality fluid containment and transport and has elevated high purity mixing technology to the next level. The Pacific Water Technology Static Mixer is the perfect solution for your CMP slurry and high purity chemical mixing needs!

Principles of Operation

All Pacific Water Technology Static Mixers are designed based on a helical mixing element, which directs the flow of material away from the wall. The mixing element design, which combines alternating right hand and left hand elements, results in flow division and radial mixing. All material is continuously and completely mixed, eliminating gradients in temperature, velocity and material composition.

Mixing Applications

Turbulent Blending Static Mixer
The Pacific Water Technology Static Mixing element produces rapid mixing by combining the effects of radial forces and flow division.

Laminar Blending Static Mixer
The alternating helical elements continually divide, stretch and reorient the flow stream to produce complete mixing with minimum pressure drop.

Liquid/Liquid Dispersion
The uniform turbulent shear field of the Pacific Water Technology Static Mixing element quickly disperses immiscible liquids and produces a narrow drop size distribution.

Gas/Liquid Dispersion
Gases can be incorporated into turbulent liquids using the Pacific Water Technology Static Mixer. Mass transfer rates are dramatically enhanced to maximize absorption or reaction.

Design

Pacific Water Technology's standard Static Mixers are six elements housed in PFA pipe or tubing.
Pacific Water Technology can supply custom Static Mixers with a varying number of elements.
Please contact Pacific Water Technology for more information on special requests.

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STATIC MIXERS SPECIFICATIONS

1/2" TO 2" STATIC IN-LINE MIXERS - MALE BSP THREAD - 6 ELEMENT				
PART NO.	**TYPE**	**DIAMETER**	**LENGTH**	**TYPICAL FLOW**
12UPVC06	GREY UPVC	1/2" BSP	185MM	0.3-0.6
13UPVC06	GREY UPVC	1" BSP	285MM	0.9-1.8
14UPVC06	GREY UPVC	1 1/2" BSP	420MM	2.2-4.5
15UPVC06	GREY UPVC	2" BSP	525MM	3.5-7.0
12PMMA06	CLEAR PVC	1/2" BSP	185MM	0.3-0.6
13PMMA06	CLEAR PVC	1" BSP	285MM	0.9-1.8
14PMMA06	CLEAR PVC	1 1/2" BSP	420MM	2.2-4.5
15PMMA06	CLEAR PVC	2" BSP	525MM	3.5-7.0

1/2" TO 2" STATIC IN-LINE MIXERS - MALE BSP THREAD - 12 ELEMENT				
PART NO.	**TYPE**	**DIAMETER**	**LENGTH**	**TYPICAL FLOW**
12UPVC12	GREY UPVC	1/2" BSP	320MM	0.3-0.6
13UPVC12	GREY UPVC	1" BSP	510MM	0.9-1.8
14UPVC12	GREY UPVC	1 1/2" BSP	785MM	2.2-4.5
15UPVC12	GREY UPVC	2" BSP	975MM	3.5-7.0
12PMMA12	CLEAR PVC	1/2" BSP	185MM	0.3-0.6
13PMMA12	CLEAR PVC	1" BSP	285MM	0.9-1.8
14PMMA12	CLEAR PVC	1 1/2" BSP	420MM	2.2-4.5
15PMMA12	CLEAR PVC	2" BSP	525MM	3.5-7.0

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STATIC MIXERS SPECIFICATIONS

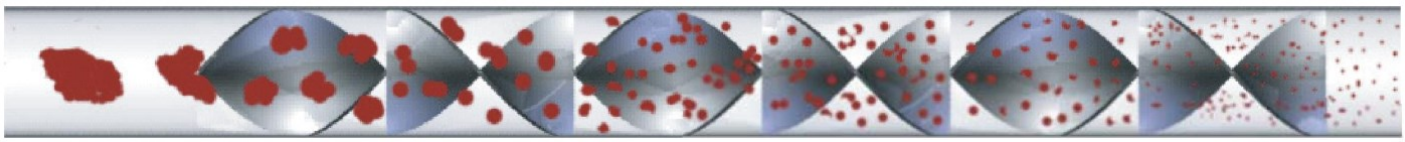
Mixing Principle

Flow is divided equally passing each element and number of divisions increases in a geometrical progression as the number of elements increase

Number of Elements (n)	1	2	3	4	5	6	7	8
Flow Division								
Number of Partitions (N)	2	4	8	16	32	64	128	256

The partition number $N = 2^n$, (where n is the number of elements.)

The uniform turbulent shear field of the static mixer quickly disperses immiscible liquids and produces a narrow drop size distribution.



Features and Benefits

- No moving parts and no contamination
- Low capital cost and maintenance
- Easy to install as standard
- No need for tanks in most cases
- Minimal space requirement

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STATIC MIXERS SPECIFICATIONS

The Minimum Number of Elements

Reynolds number should be determined to specify the required number of elements. The Reynolds number can be calculated namely;

$$Re = \frac{4\rho Q}{\pi \mu d}$$

where :

Q = Fluid flow rate, m /s ^{3}

ρ = Fluid density, kg /m ^{3}

μ = Viscosity, kg/m-sec

d = Inside diameter of pipe, m.

Flow Regime	Reynold's Number (Re)	No. Of Elements
Laminar	<10	24 - 30
	10 - 100	20 - 24
	100 - 500	18 - 20
Transitional	500 - 1,000	12 - 18
	1,000 - 5,000	8 - 12
Turbulent	5,000 - 100,000	6 - 8
	>100,000	4

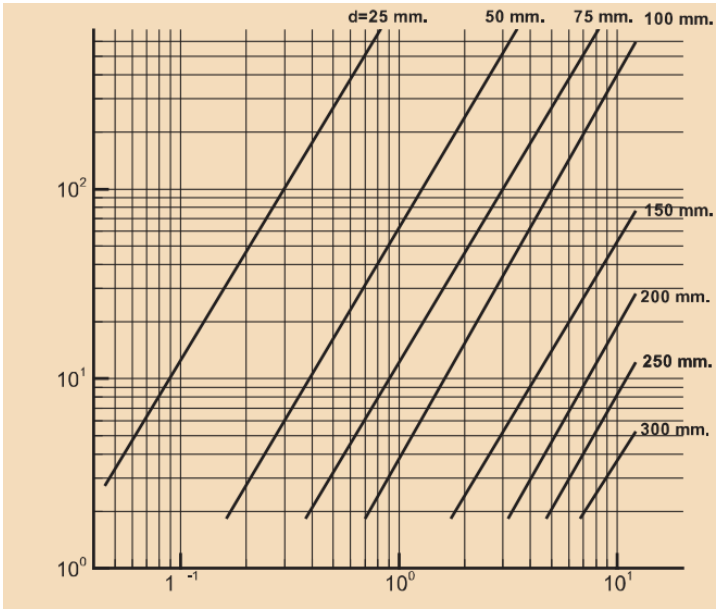
Material of Construction

- Stainless steel 304 & 316L
- PVC, PP and PE
- Carbon Steel

End Connection

Pressure Drop Number of Elements

If the process materials are waterlike, with S.G.= 1.0 and viscosity less than 10 cPs, the graph below will provide an approximate value of expected pressure drop per element.



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STATIC MIXERS SPECIFICATIONS

The required number of elements can also be approximated via different kinds of mixing namely;

Number of Elements	Applications
1 - 4	Mixing of gas and low viscous fluids
4 - 6	Mixing of low viscous fluids Homogenization of high viscous fluids Uniformity of temperature
6 - 12	Gas - liquid contraction Blending of heavy oils Alkali washing Aeration
12 - 18	Mixing of medium viscous fluids Extraction/emulsification
18 - 24	Mixing of high viscous fluids Mixing of two - component resins/adhesives
>24	Heat exchanger/reactor Specific purposes

Static mixers are widely used in the process industry for a large variety of mixing applications.

Typical Application

Agricultural Chemicals

- Fertilizer and pesticide preparation
- Gas/Liquid dispersion
- Dilution of feed concentrates

Chemicals

- Chlorination and oxidation
- Organic/aqueous dispersions
- Dilution of acids and bases

Foods

- Blending food constituents
- Washing fats and oils with acid
- Heating and cooling sugar solutions
- Starch slurry cooking

Pharmaceutical & Cosmetic Applications

- Nutrient blending
- pH control
- Sterilisation
- Starch conversion
- Chemical preparation
- Mud dilution
- Mix cream of various viscosities

Application in Industrial Processes

Minerals Processing

- Metals Recovery by solvent extraction
- Chemical addition and pH control
- Oxidation and bleaching

Paints and Resins

- Dilution of TiO slurries
- Colouring and tinting
- Solvent blending

Petrochemical & Refining

- Blending gaseous reactants
- Washing hydrocarbon streams
- Gas scrubbing
- Lube oil blending
- Blending reactants & catalysts
- Thermal homogenisation
- Plug flow finishing reactors
- Preheating polymers prior to devolatization