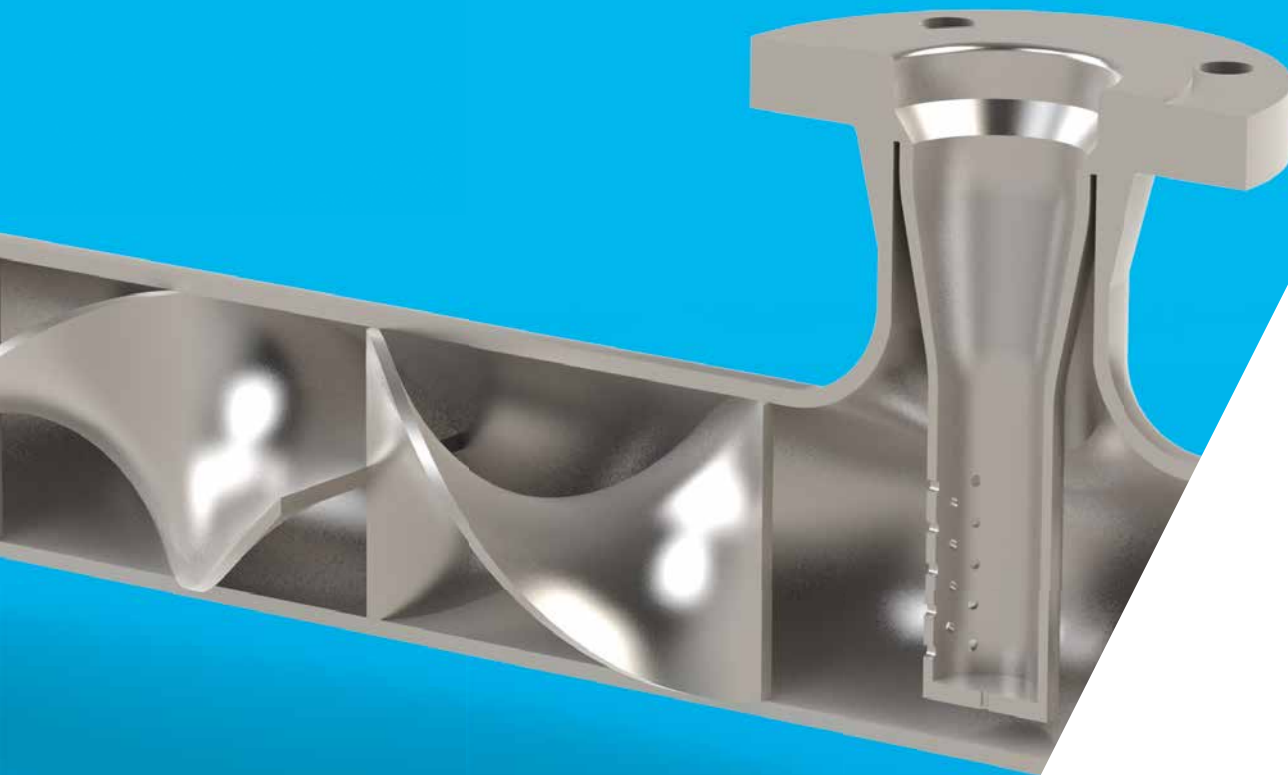


Mixing and conditioning of liquids and gases

STATIC MIXERS & HEAT EXCHANGERS



PRIMIX[®]
PERFORMANCE BY DESIGN

STATIC MIXERS & HEAT EXCHANGERS

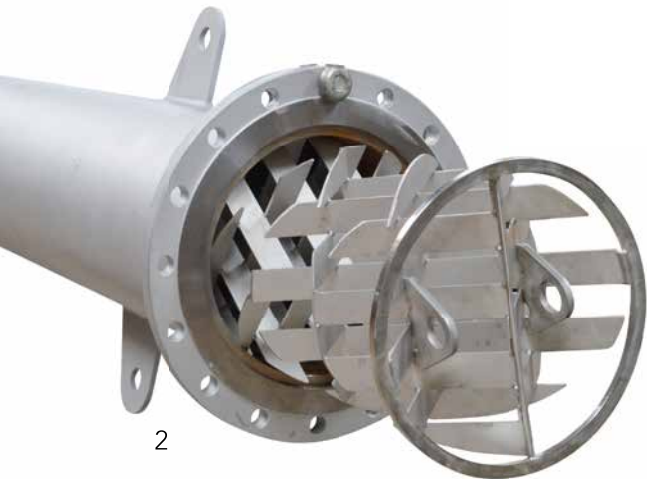
PRIMIX has been going for over 30 years and has built up a reputation as an international supplier of top quality static mixers and heat exchangers. Most of the mixers are developed specifically based on the customer's process application. This is done with great care and attention by an experienced and highly-trained workforce.

PRIMIX PERFORMANCE BY DESIGN

At PRIMIX we believe that maximum performance in the process can only be achieved with the right design. In the design we combine our extensive knowledge in the field of fluid dynamics with a very precise way of working. All parameters and preconditions are considered before the design process is started. We can think outside the box and come up with solutions for new applications and complex issues. Only when we know for sure that all parameters have been identified, will we design the best mixer or heat exchanger for your process. Certification and classification are seen as an integral part of the design process and this guarantees components that deliver maximum performance in the process and also meet all certification and document requirements.

ADVANTAGES

- Highly efficient static mixers and heat exchangers that link 100% into the process
- Energy-and cost-saving, sustainable and maintenance-free technology
- Partner for engineering companies and industry with worldwide support
- Over 30 years experience and extensive knowledge of fluid dynamics
- Mixer sizing and design with PRIMIX calculation software and 3D CAD software
- Full mechanical and performance guarantee
- Single source – own engineering and production facility for quick, reliable delivery
- State of the art R&D - with support from TU Delft and TU Eindhoven
- Flexible organisation with short lines of communication



THE RIGHT SOLUTION FOR EVERY APPLICATION

Whether you are looking for a static mixer for a large-scale chemical process, to cool down food products or to mix additives in water treatment, PRIMIX offers the right solution for every application.

PRIMIX static mixers and heat exchangers will allow you to accurately mix, process and condition liquids, gasses and dispersions.

PRIMIX mixers and heat exchangers are fully geared to the desired process flow volumes with flow rate diameters varying from 2 metres to 4 mm. Depending on the process; the finish may be electro-polished, extra durable and/or fully hygienic.



STATIC MIXERS

A PRIMIX static mixer lets you create a homogeneously distributed mixture between liquids and/or gasses in a continuous process. This is done without any moving part, with the result that no extra electrical supply or mechanical elements are required. This makes the PRIMIX static mixers very low-maintenance components and extremely safe from a process-technical point of view.

A PRIMIX static mixer is easy to clean in a CIP cycle and depending on the process requirements, the system may have a fully sanitary/sterile/aseptic finish. In the case of static mixers with removable mixer elements, cleaning can be done externally. This is very practical for example in the processing of highly viscous media.

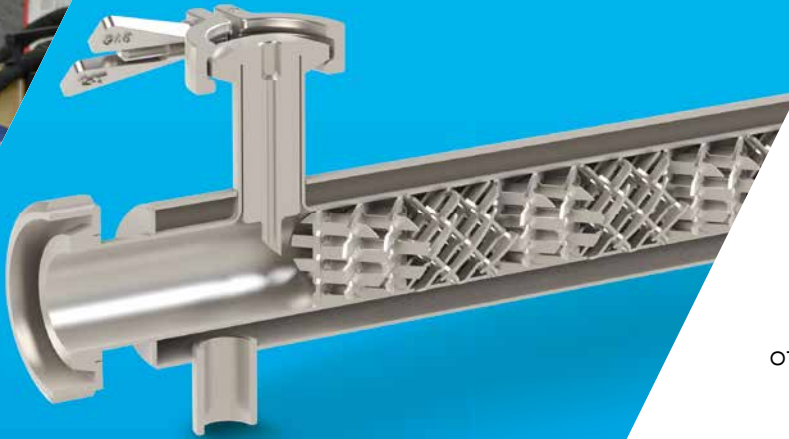


MIXING LIQUIDS & GASES



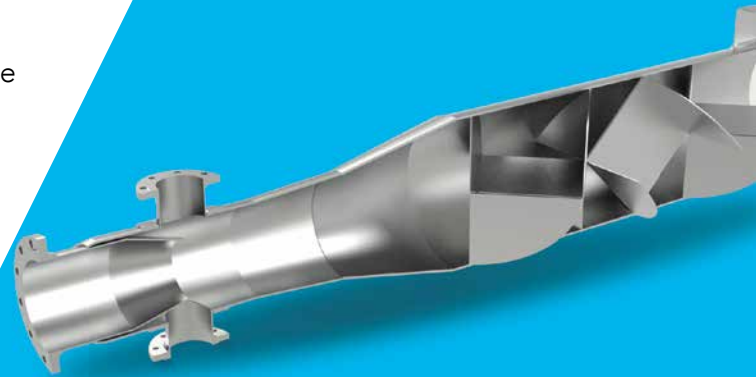
LAMINAR FLOW

In a static mixer based on the laminar principle, the flow is repeatedly split into sub-flows, which are then merged again. The correct pitch creates a balanced flow from outside to inside and vice versa. The medium to be mixed is thus mixed in a large number of thin layers and the number of layers created is what determines the degree of mixing.



TURBULENT FLOW

With a static mixer based on the turbulent mixing principle, the mixing effect is mainly achieved by internal rotation and the shearing of the layers of fluid at the point where the direction of rotation is reversed. When small rates of shearing are required, a pitch between two rotations can be programmed. This pitch delays the rotation process and causes an additional mixing effect. After that, the reversed rotation starts more slowly.



Mixing for each volume flow, density, viscosity and substance-specific properties

- Liquid – liquid mixing
 - Miscible liquids, i.e. water & caustic
 - None-miscible liquids, i.e. water & oil
- Liquid – gas mixing, i.e. water & CO₂
- Gas – gas mixing, i.e. flue gas & oxygen

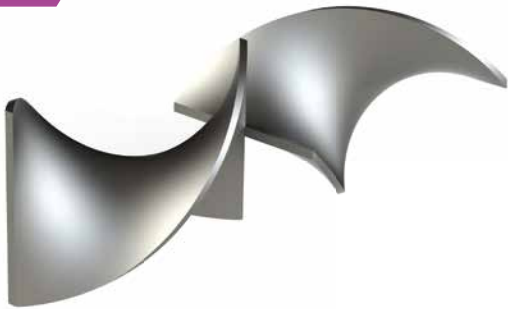
Advantages:

- No moving parts
- No mechanical seals
- No maintenance
- No leakage
- Predictable homogeneity
- Low energy dissipation
- Low investment / short return of investment
- Easy scale-up
- In line processing

OVERVIEW MIXERS

With the PMS, PMQ, PMX and PMV mixers, the performance is geared 100% to the process

PMS



- Standard helical or spiral shaped elements
- Up to ± 160 mm diameter
- Suitable for basic mixing applications, liquid and gas
- Used for heat transfer enhancement
- Available in wide range of materials

PMQ



- Quatro shaped elements
- Performance equal to PMS
- From ± 160 mm diameter to infinity
- Suitable for basic mixing applications: liquid and gas

PMX



- X-crossed type element
- Wide range of sizes
- Relative high pressure drops and almost dead spot free
- Very suitable for high viscosity mixing

PMV



- From ± 50 mm diameter to infinity
- Very suitable in large diameters
- Most suitable for gas mixing or high contact surface
- Used both in gas and liquid



QUICK DELIVERY

PRIMIX can supply over 10,000 variants of quality mixers from stock. These mixers from the QDS range are put together in no time from loose stock components and the same engineering expertise is applied as in the PRIMIX custom-made mixers.

QDS Static mixers available from stock

QDS mixers are if necessary be delivered within 48 hours. Just like the custom-made mixers, all QDS mixers are fully geared to the process and designed to the process parameters indicated.

- AISI 316L and PVC
- Up to ± 160 mm diameter
- Suitable for all basic mixing applications of liquid and gas



QDS Quick delivery system - 48 hour delivery
Advanced custom mixer technology at very attractive conditions

HEAT EXCHANGERS

The PRIMIX spiral-shaped mixer element is the basis of the PRIMIX heat exchangers that can be used to heat and cool viscous products.

Improved heat transfer.
Lower pressure drop and
shorter residence times

With its advanced design, the PRIMIX heat exchanger holds a unique position between conventional shell and tube heat exchangers. All PRIMIX heat exchangers are designed and produced to customer specifications. The heat exchangers are available for the treatment of all sorts of viscous liquids.

Quicker refreshment, better heat transfer

The design of the spiral-shaped element naturally provides increased transfer – up to a factor of 3. This is caused by the strong radial flow that generates an increase in the refreshment rate on the walls of the process pipe. When low tolerances and nickel-high vacuum-brazed techniques are implemented, this factor may even add up to a factor of 10.

ACT

With ACT 20% – 100% more transfer of heat

The advanced connection technology (ACT) applied between process tube and mixer elements results in additional surface with exchange rates that are equal to the base material of process tube and mixer element. As a result of this property, the surface of each mixer element will act as additional heat transfer, which results in 20% to 100% better heat transfer compared to conventional heat exchangers.

Advantages:

- Special distribution head and mixer element connection result in true plug flow preventing product degradation
- Improved heater transfer rate – resulting in 30 – 40% lower weight
- Low pressure drop at product and service fluid side
- Lower volumes and shorter residence times

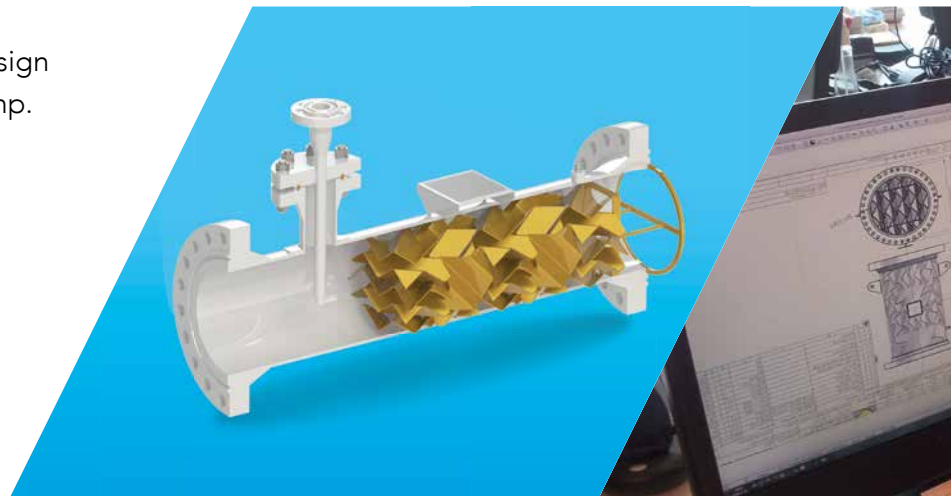


IT'S ALL IN THE DESIGN

At PRIMIX design is more than just design. It involves engineering and thinking through the process with the customer. Clearly setting the relevant parameters and where necessary asking the critical questions. The aim of this is to achieve the maximum performance in the process. The design envisaged is translated into our own PRIMIX Dynamics software and this is then designed in SOLIDWORKS®

The Design also involves providing a disciplined, manageable document flow. At PRIMIX, we understand that Design is backed up with carefully matching certificates and documents. Creating Data, Mechanical and Record books is thus an integral part of the design.

PRIMIX also designs and delivers under different design codes, including: EN-13445, PED, ASME and U-Stamp. PRIMIX is of course ISO-9001 certified.



GENERAL		NON DESTRUCTIVE EXAMINATION		
DESCRIPTION	VALUE	DESCRIPTION	VALUE	STANDARD
Part number	13-1068	Hydrotest test	Yes	ASME VIII
Serial number	13-1752-01	Radiographic test (RT)	Yes	ASME VIII
Quantity required		Ultrasonic test (UT)	No	ASME VIII
Flow mounting position	Horizontal	Magnetic particle test (MT)	No	ASME VIII
		Particle measurement test (PT)	No	
Material method elements	Non-weldable	Steel hardness test (HT)	No	
Material method	13-111-001 12 mm dia	Positive Material Identification (PMI)	Yes	For all parts
Marking		Pressure application test	No	
		Visual inspection	Yes	100%

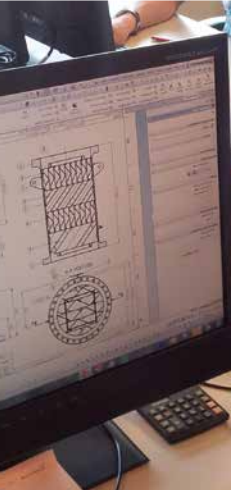
NOZZLES	NOMINAL DIAMETER	RATING	TYPE	PSI/RG	MEDIUM	REMARK	RANGE (mm)
N1	1/2"	6008	1/4" NPT ASME B16.5	2-4.3	Water		100-200
N2	1/2"	6008	1/4" NPT ASME B16.5	2-4.3	Water		100-200
N3	1/2"	6008	1/4" NPT ASME B16.5	2-4.3	Water		100-200
N4	1/2"	6008	1/4" NPT ASME B16.5	2-4.3	Water	With cover flange	100-200
N5	1/2"	6008	1/4" NPT ASME B16.5	2-4.3	Water	Pressure testing nozzle	100-200

PRIMIX applies rigorous standards when it comes to transport conditions and packaging. At PRIMIX, this is already factored in at the design phase to ensure that your process equipment arrives on site in perfect condition.

4		5		6		7		8	
TREATMENT		MATERIAL		DESCRIPTION		DESIGN PROPERTIES		VALUE	
NO.	DESCRIPTION	YES/NO	VALUE	DESCRIPTION	VALUE	DESCRIPTION	VALUE	DESCRIPTION	VALUE
1	Post Weld Heat Treatment (PWHT)	No	None	ASME B16.3.1	1	Design Pressure (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
2	Post Weld Heat Treatment (PWHT)	No	None	ASME B16.3.1	1	Minimum Design Metal Temp (MDMT)	(C)	ASME B16.3.1	1
3	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
4	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
5	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
6	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
7	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
8	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
9	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
10	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
11	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
12	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
13	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
14	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
15	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
16	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
17	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
18	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
19	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
20	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
21	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
22	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
23	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
24	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
25	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
26	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
27	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
28	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
29	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1
30	Painted	No	None	ASME B16.3.1	1	Design Temperature (ref: Item 1)	17.20 Bar(g)	ASME B16.3.1	1

REV	DESCRIPTION	DATE	DRAWN	APPROVED
0	For approval	25.4.2013	MR	EP
1	For approval	25.4.2013	MR	EP
2	For production (detail drawings)	29.4.2013	MR	EP
3	As built	13.9.2013	MR	EP

NO.	DESCRIPTION	ASME B16.2.2	SAFETY Gr. 2H	3.1	16	1/4" UNC
30	Heavy Hex Nut	ASME B16.2.2	SAFETY Gr. 2H	3.1	16	1/4" UNC
29	Washer	ASME B16.2.2	SAFETY Gr. 2H	3.1	16	1/4" UNC
28	Blindbolt	ASME B16.20	SAFETY Gr. 2H	3.1	8	1/4" UNC L=165
27	Blindbolt	ASME B16.20	SAFETY Gr. 2H	3.1	8	1/4" UNC L=165
26	Spring Washer E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
25	Washer	EN 127 B	SAFETY Gr. 2H	3.1	2	For M10
24	Interchange Nut E.E.	EN 127 B	SAFETY Gr. 2H	3.1	2	For M10
23	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
22	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
21	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
20	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
19	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
18	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
17	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
16	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
15	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
14	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
13	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
12	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
11	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
10	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
9	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
8	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
7	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
6	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
5	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
4	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
3	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
2	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10
1	Blindbolt E.E.	EN 127 B	SAFETY Gr. 2H	3.1	1	For M10



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PERFORMANCE FOR YOUR APPLICATION

PRIMIX static mixers and heat exchangers have proven themselves highly reliable in a wide variety of applications. From conventional bulk processes, precision mixing at millilitre level and also in critical processes, where the risk of explosion, toxicity, corrosiveness and temperature sensitivity in media play an important role. It is mainly in these applications that the PRIMIX systems offer huge benefits.

“ Besides improved heat transfer, a small spread of residence time is of major importance. During the cooling process, the polymer flow reacts as well and polymer flowing through the system at a longer residence time than foreseen can harm the quality of the end product. To solve this problem, PRIMIX has chosen to design unique manifolds that ensure a perfect spread of product over the parallel process tubes, while dead spots are completely eliminated.”



PETROCHEMICAL INDUSTRY

- Crude oil blending and desalting with water
- Blending of diesel, gasoline, lubricants and natural gases
- Wash water mixers
- Crude homogenization before BSW measurement
- Sweetening of kerosene and gasoline



CHEMICAL INDUSTRY

- Chemical liquid mixing and dilution
- Tube reactors
- Mixing of gas streams
- Evaporation
- pH correction by adding alkali or acid
- Gas liquid contacting

POLYMERS AND FIBRES

- Polymer melt homogenization
- Removal of volatile components
- Cooling of fibre / polymer melts
- Ad-mixing of additive
- Use in production systems for PS, PET, EPS and PLA
- Plastic processing - Injection moulding

Obtaining consistent mixing concentrations, temperatures and resident times ... resulting in maximum process performance

FOOD AND BEVERAGES

- Blending e.g. flavours, colour additives or fruits into chocolates, yoghurt and fondant
- Temperature conditioning e.g. cooling of spreads and butters
- Pasteurization
- Carbonization of beer
- Homogenization of products in sweets production



PHARMACEUTICAL INDUSTRY

- Penicillin production
- Inhalable insulin production
- Cosmetics
- Mixing additives into soaps
- Pasteurisation and/or sterilization
- Detergent production

WATER AND WASTEWATER TREATMENT

- Ozonisation of water
- Aeration of water
- Mixing of HCL, NaOH, H₂SO₄, lime in waste water
- Water preparation (pH and temperature)
- Desalination of seawater
- Mixing of flocculants into waste water or sludge

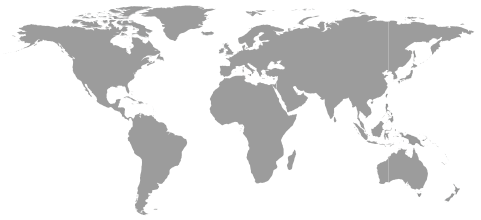
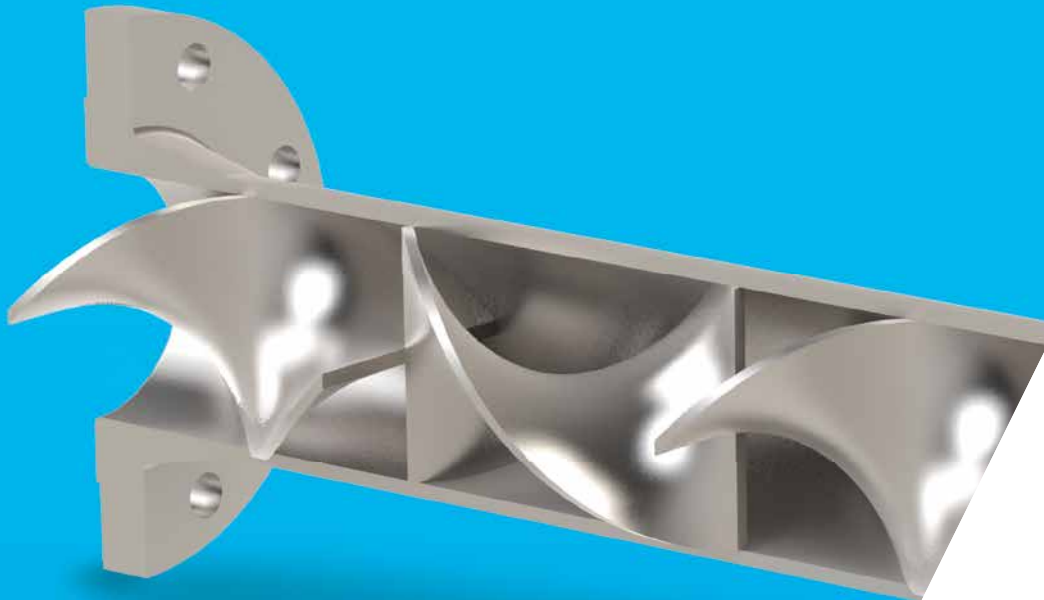


CIP and Sanitary mixers

Within the food and pharmaceutical industry, aspects like CIP cleaning, smooth and/or polished surfaces and sanitary connections are of major importance when it comes to achieving low germ counts. Day to day practice has shown that compared to an empty pipe, the use of static mixer elements leads to considerably better cleaning results. The forced refreshment and higher product velocities at the inner wall of the process tube are what cause this positive result.



Easy cleaning and sterilisation. Shorter process times and more consistent product quality



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