

Fluitec Documentation No. 11.110 Rev. 1

Static mixers for turbulent flow Made of stainless steel

Fluitec mixers made of stainless are used in all areas of chemical process engineering. Different designs allow the use of static mixers in a wide field of applications, including the homogenisation of two components with big differences in viscosity. The novel mixer type CSE-F® is an inexpensive solution for mixing tasks in turbulent flow ($Re > 10'000$). Stainless steel such as 304 L, 316 Ti and 316 L is the standard material, for all type of Fluitec mixers.

The Fluitec mixer CSE-B

The mixer CSE-B type "T" is exclusively used in turbulent flow of Reynolds numbers > 2400 . The special geometry of type "T" induces strong vortices at very low pressure drop. It can therefore be used in all fields of application for turbulent mixing. For applications of diameters smaller than DN65, however, the well established CSE mixer is used.

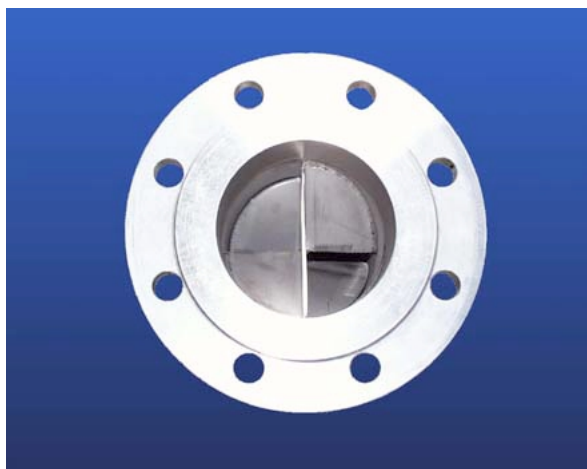


Fig. 1: Frontal view of CSE-B mixer

Fields of application of the CSE-B mixer

The CSE-B mixer type "T" is especially suitable for mixing operations with aqueous solutions as continuous phase. A flow-rate ratio of additive to main stream of up to $1:10^6$ is possible. Mixing processes with a viscosity ratio of up to $1:600$ of the two liquids are successfully realized with the mixer type CSE-B. Its unique geometry allows the reliable use in different applications:

- mixing of additives in turbulent flow
- mixing of gas
- dispersion of low-viscous and insoluble liquids

Assembly

Fluitec CSE-B mixer with flanges according to 2633 PN16 (for chemical applications) and DIN 2501 PN10 (for water treatment) are standard constructions. Certifications according to EN10204-3.1B as well as production and pressure certificates are supplied on request. CE-Indication of the mixers is basically possible. Removable mixing devices are manufactured on request. The mixer type "T", however, is normally designed as a fix installed device.

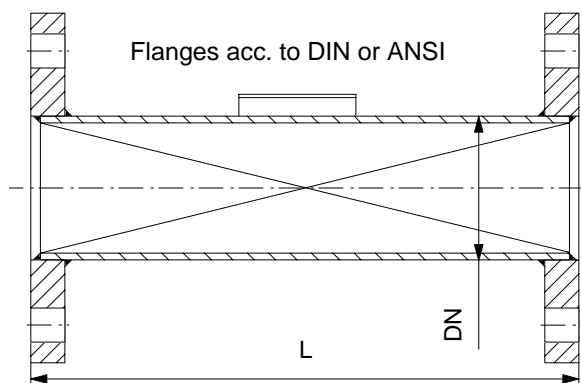
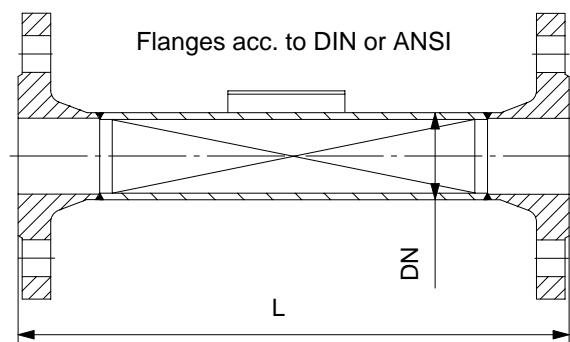


Fig. 2: Fluitec standard mixer CSE-B

Static mixers out special materials such as Hastelloy, titanium, PTFE coated steel, glass, ceramics or plastics such as PP, PVC, PE and PVDF are available on request.

Low-cost mixer CSE-F

Removable mixing modules from Fluitec are used in an increasing number of applications of turbulent mixing. The mixer type CSE-F is reasonably priced and easily integrated into already existing pipes. The extremely small pressure drop at a high mixing efficiency is a special characteristic of the CSE-F. This mixer type can be delivered with or without an integrated feeding device. No pressure or construction certificates are necessary, thus allowing low manufacturing costs of the CSE-F mixer even for applications in chemical industry. Detailed investigation on this patented mixer type was conducted at Zurich University of Applied Sciences, ZHW.



Fig. 3: Fluitec mixer CSE-F

Fluitec mixer CSE-W

The Fluitec helical mixer CSE-W is used for applications of small diameters. Due to its L/D ratio the CSE-W mixer is especially suitable for applications

in heat exchangers and residence time reactors. The CSE-W mixer is not suitable for complex or difficult mixing operations that require a sophisticated mixing process.



Fig. 4: Fluitec mixer CSE-W

Fluitec mixer CSE-X/4

For applications with highest demands, the Fluitec mixer CSE-X/4 is used. In comparison to other mixing elements of type x, the CSE-X/4 generates a much smaller pressure drop at similar mixing efficiency. Due to this unique characteristic, the CSE-X/4 is used in a very wide field of applications: from gasification to reactions that require a narrow residence time distribution or for mixing tasks with an extreme ratio of viscosity.



Fig. 5: Fluitec mixer CSE-X

Mixer geometries

The variety of CSE-mixers, allows the use of static mixers in almost any kind of application. In turbulent flow, the CSE/CSE-B mixer type "T" is the mixer type with the highest mixing performance related to its length.

The removable CSE-F module is a reasonably priced solution for many, rather simple applications, while the CSE-X mixers is capable to cope with complex mixing tasks, such as mixing of two fluids at laminar flow with a high ratio in viscosity.