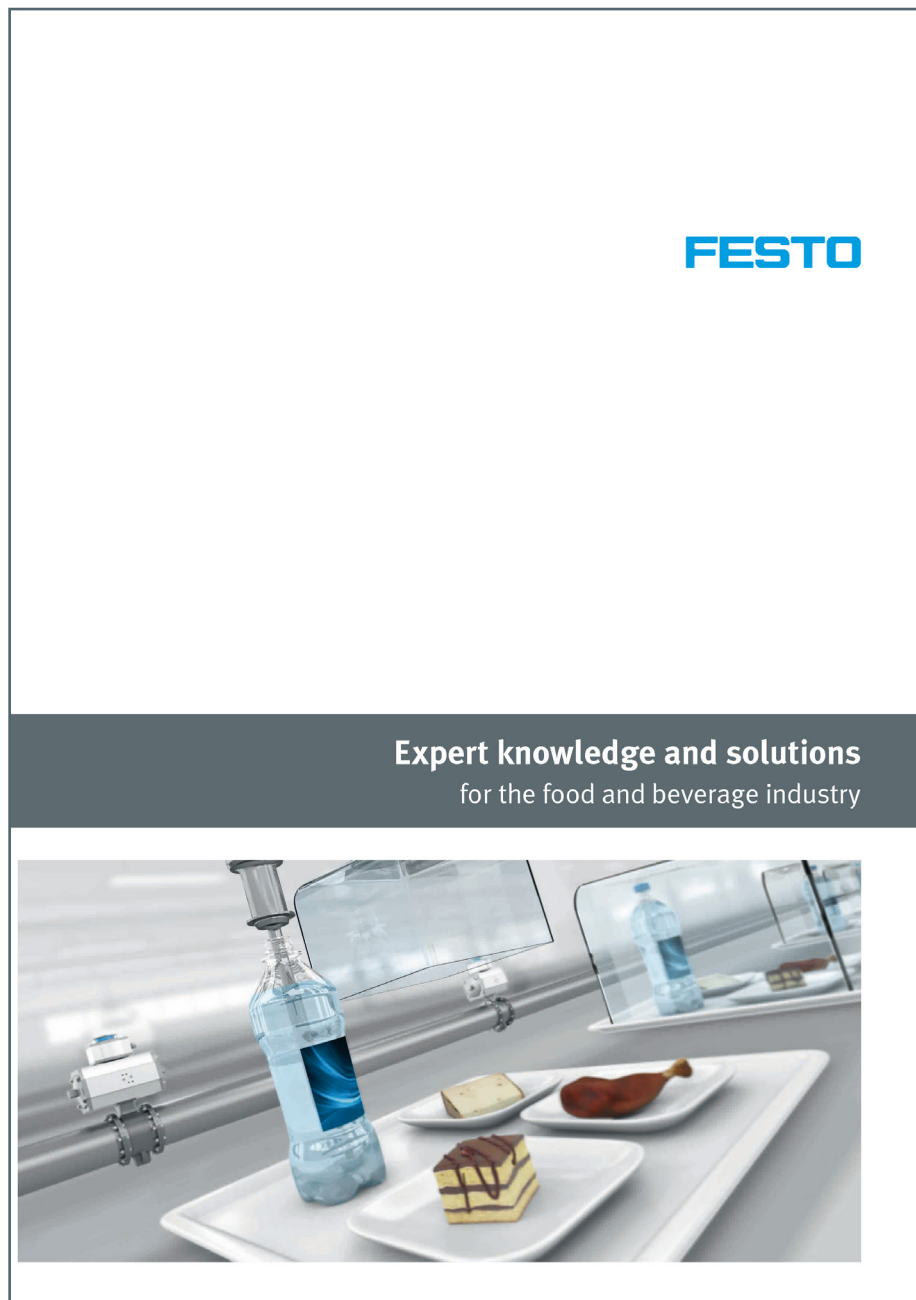


# Machine design and design requirements

**FESTO**

excerpt from:



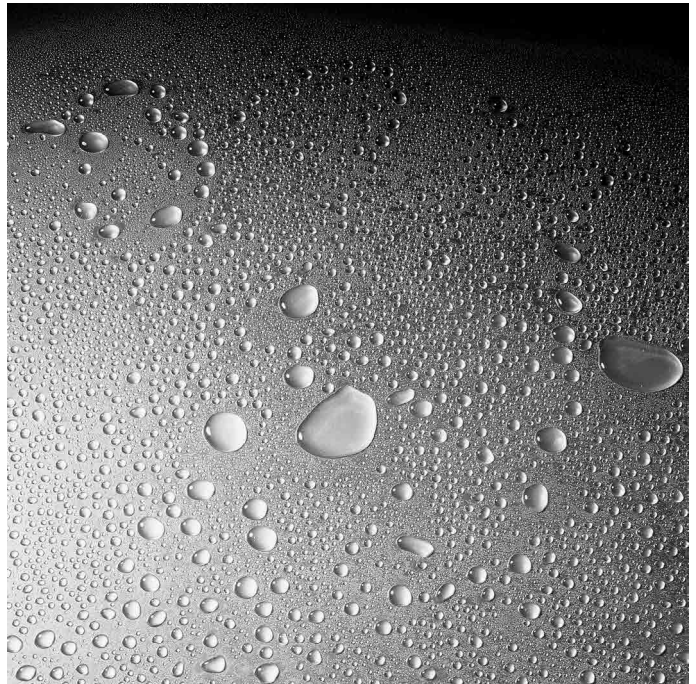
## Machine design and design requirements

### Components conforming to standards

The practical application of the theoretical principles outlined in EN 1672-2 and DIN ISO 14159 is of the essence for the hygienic design of machines and components. These standards specify the fundamental design elements to be used in the construction of systems.

### Surfaces

A high surface finish is absolutely essential for parts that come into contact with the product in order to prevent microbial contamination. This is guaranteed through the use of a mean peak-to-valley height of  $\leq 0.8 \mu\text{m}$  according to ISO 468 within the food zone. This means that micro-organisms and spores ranging from 1 to 10  $\mu\text{m}$  in size will be removed from the surface at a cleaning agent flow velocity of 2 m/sec. Components with a peak-to-valley height of  $\leq 3.2 \mu\text{m}$  are often used in the splash zone. As well as having a higher surface finish, these components also have greater corrosion resistance. A smooth surface can be achieved through grinding, blasting and electropolishing, for example.

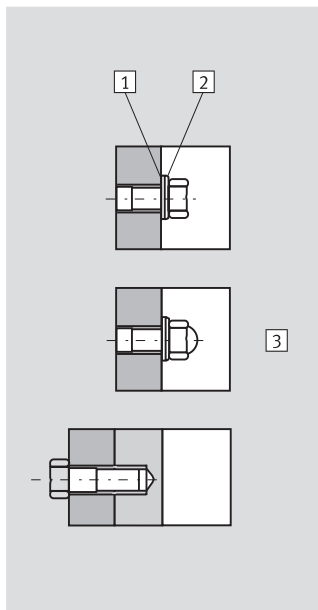


### Connecting pieces, threads

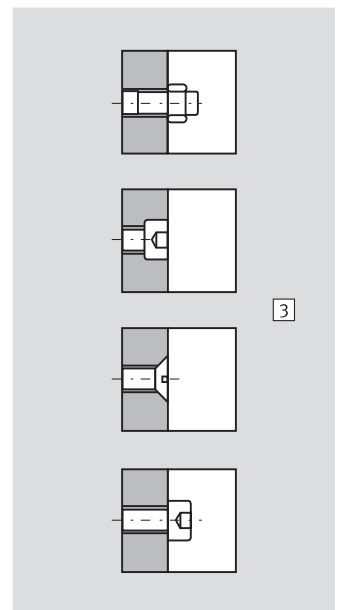
Connecting components such as screws, bolts, rivets and so on may cause hygiene problems. If they are unavoidable for technical reasons, they must be easy to clean and disinfect. Open threads are extremely difficult to clean and provide the perfect breeding ground for germs. The smallest spaces between a metal-metal contact cannot be cleaned.

Any threads that cannot be avoided should therefore be closed off with suitable blanking caps and sealed.

#### Correct



#### Incorrect



- 1 Seal
- 2 Metal stud rubber seal
- 3 Product side

## Machine design and design requirements

### Eddy water

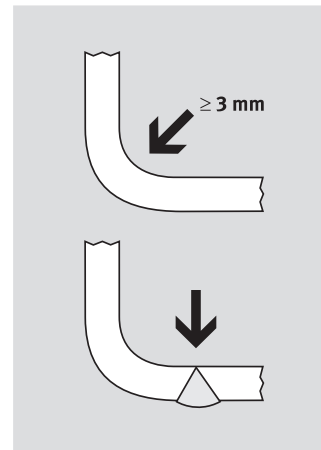
Product containers, production spaces and product lines must be self-draining for liquids or the remaining liquid must be removed via other measures. Product lines must be installed with an incline of at least 3° relative to a drainage point.

Slack pipelines, dead ends and puddles must be avoided at all costs. If any of these requirements cannot be fulfilled, the system should be designed so it can be easily dismantled.

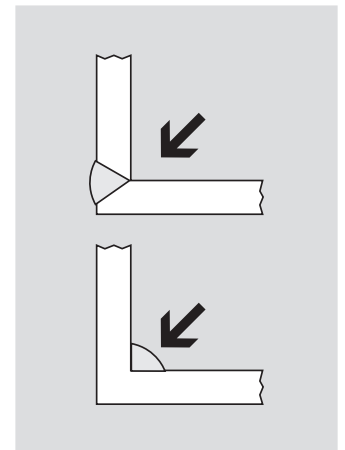
### Inner angles, corners and radii

Very small radii and corners are always a hygiene risk. Because the flow velocities of the cleaning agents and disinfectants are substantially reduced here, the required cleaning effect cannot be achieved. The prescribed minimum radius is 3 mm.

#### Correct



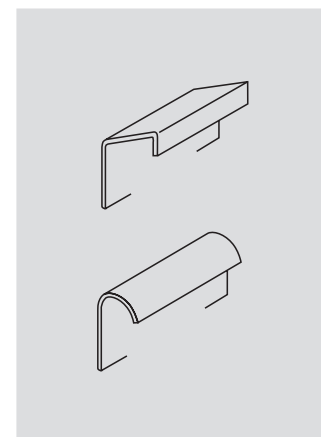
#### Incorrect



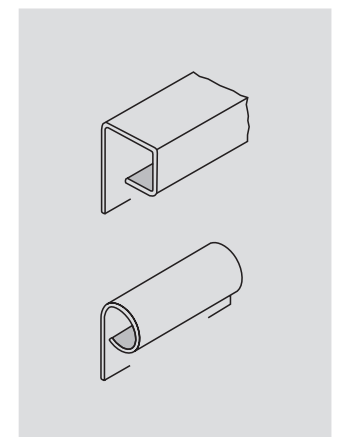
### Dead space, shadow surfaces

All machines and system components must be designed without dead spaces. Any product remnants in these dead spaces cannot be removed and thus cause contamination. Important plant components must therefore be designed to be either completely open or completely sealed.

#### Correct



#### Incorrect



### Bearings and shaft openings

All bearings must be attached outside of the food zone. If this is not possible for technical reasons, they should be lubricated with lubricants approved for use in the food industry.