

12.9 Valves

A wide range of valves is used in the distribution of chocolate and their design should be suitable for hygienic applications. Not all valves are suitable for all applications and careful consideration should be given to installing the correct valve. If a pigging system is to be used then the valve must not obstruct the travel of the pig. To prevent cold sections around the valve, the valve should have a hot water jacket or be electrically trace heated. The valve must be selected to be compatible with the operating pressure of the system. Valves should be installed to avoid dead-legs.

12.9.1 Plug cock valve

The plug cock valve (Figure 12.12) is widely used in the food industry and can be used as a simple on/off device, as a diverter valve or to throttle the flow. The design of this valve does not lend itself easily for remote operation, cannot be cleaned in place and it is difficult to add a water jacket.

12.9.2 Butterfly valve

The butterfly valve (Figure 12.13) is a simple on/off device and two or more can be used to divert flow. It can be manually operated or it can be fitted with a powered actuator to assist automation. Because of its slim design it is often unnecessary to provide a heating jacket.

12.9.3 Ball valve

The ball valve is similar in principle to the plug cock valve except that the plug is replaced by a sphere. Ball valves provide on/off control with the minimal pressure drop. They can be manually operated or powered by an actuator, and are suitable to be operated at high pressures.

Figure 12.12 Three-way plug cock valve.





Figure 12.13 Butterfly valve (shown in open position).

The construction of a standard ball valve does lend its self to be easily dismantled for cleaning. Chocolate will become trapped between the ball and the housing and this could result in product contamination during subsequent process operations. If a ball valve is to be used then it is essential to choose a valve designed to comply with hygienic conditions.

12.10 Contamination removal

12.10.1 Magnets

The equipment used to manufacture chocolate is, more often than not, made from carbon steel of various grades. Wear of these machines can contaminate the chocolate with small amounts of ferrous material. Magnet traps, fitted into the pipeline have been used to successfully remove ferrous contamination. The magnets are encapsulated in stainless steel and form a matrix of fingers that the chocolate flows around. The magnets are fixed into a water-jacketed housing and they need to be regularly removed for cleaning. Failure to clean the magnets will result in them becoming inefficient and contaminating metal could drop off. Usually the magnetic trap can only be installed in pipelines that operate below 5 bar and so they are often installed in the feed to a tempering machine.

12.10.2 Sieving

It must be remembered that magnets cannot remove stainless steel and aluminium contamination. These and other hard particles can be removed by sieving. The position of the sieve may need careful consideration. It is normally recommended that a sieve is installed prior to the feed tank to chocolate tempering machines. The aperture size of the sieve will be dependent upon the quality of the chocolate; an aperture size of 40 μm is often used.