

Some major types of closures for bottles

1. Crimp seals:

a. Removable crimp seal – the flat foil of metal is pressed over the bottle and crimped around the groove in the external surface of the containers neck. Too thick foils may cause poor seal and poor release while too thin foils may give higher chance of leakage and premature puncture. Example, milk bottle, sauce bottle, etc.

b. Permanent crimp seal – this seal is not intended to remove hence much stronger and stiffer. Mostly seen in pump and spray applications.



2. Diaphragm seals:

a. Adhesive bond – the filled containers are passed under an adhesive roller that put adhesive on the top surface of the container. The diaphragm is then applied to the adhesive coating. Can be removed by peeling or puncturing the diaphragm. Example: coffee containers.

b. Induction welding – the container is treated itself that accept thermoplastic layer that is on the diaphragm membrane. The filled containers with caps are passed through a machine that applies induction heating to the cap assembly. The resulting heat melts the thermoplastic layer and adheres to the upper surface of the container. The seal becomes effective as soon as it cools down. It is majorly used for liquid product.



c. Radio frequency (RF) welding – sealing is done by RF where the RF waves vibrates the seal molecules and resultant friction generated at seal surface cause heat generation that activates the sealing medium.

3. Corks – popular for blown glass bottles where the shape may have irregularities. Since cork can be compressed and deformed it can fill an irregular shape. Cork also has ability to exert a pressure on the glass container, specially when it is wet, it helps to maintain a good seal. It is mostly used for wine storage since it can provide good sealing along with low moisture transfer rate.



4. Bungs – PVC and rubber are two most commonly used materials for bungs. The bungs provide good sealing but it comes into direct contact with the product. Hence compatibility of the bung materials with product is to be tested. Also the surface lubricant used for setting the bungs must be compatible with the inner product.



5. Crown cork – it is tinplate cap, lined with cork liner. This is placed over the bottle neck and crimped into position. The crimping action exerts pressure onto the cork liner and thus the cork moulds itself into the irregularities of the bottle. Crown corks are single use type since, once removed it is difficult to replace.



6. Screw caps

a. Push on – twist off caps – in production line it is pushed and the threads on the bottle surface create the threads on the cap. Then during use it is twisted to open and twisted back to close. Tinplate, aluminum, plastics are commonly used materials for this type of caps.



b. Tinplate caps – most of the applications are in hot-filled products where on cooling a vacuum forms within the container. The advantage of tinplate is that it can deform under this vacuum. Although when used it retains a convex shape but due to vacuum it turns into concave.

c. Aluminum cap – mainly used as roll-on-pilfer-proof (ROPP) caps. ROPP cap is applied as a cap with a cylindrical cross-section and no threads. On application the cap is distorted around the securing neck in the bottle neck. Aluminum can also be used as crimping seal, but possibility of splitting is much higher.



7. Dispensing system

a. Rotary system – in most of the cases it is a two part closure. Internal piece provide sealing on the container and the outer part sealing on the internal section of the closure. By twisting the outer part of the closure dispensing holes of the inner and outer part aligns to dispense powder. Example: body powder bottles.



b. Shake dispenser – same as rotary dispenser but lid that covers the hole is lifted instead of twisted.

c. **Plug dispenser** – it fits with the bore of the bottle and helps to keep the bottle neck clean.

8. Pumps

a. **Pump pack (lever and push button)** – pumps can be crimped or screwed, depending on whether refilling is required or not. Many pump packs use a dip tube to draw product from the container.

b. **Vials or ampoules** – it is for single use. The neck is heated red hot and sealed to make the vials after filling. The cut line is used to cut the vial and product is withdrawn by hypodermic syringe.

