

Influence of crown corks on beer quality

SUSTAINING BEER QUALITY | Breweries devote continuous attention towards improving and stabilising beer quality. In order to fill the perfect beer, choice of raw materials as well as the brewing process is subject to the most stringent specifications and tests. Unfortunately, thorough quality monitoring often stops at this point.

DEVELOPMENT OF CROWN CORKS,

as well as the ongoing progress in brewing and filling processes, led to an improvement of beer quality. Initially, crown corks were made with natural cork inserts, associated with relatively high oxygen permeability and a typical cork taste. Later, inclusion of tin foil on the cork inserts solved the problem at that time. As of about 1970, PVC foamed compounds came on the market and, with the associated enhanced sealing, improved beer quality. Furthermore, use of this sealing compound made it possible to achieve much higher production speeds. As a result of using plasticisers and phthalates and high gas exchange of these sealing compounds, a PVC-free sealing compound was launched about 1985 and has continued on up to the present day. This sealing compound is free of phthalates, has lower gas exchange than foamed PVC seals, has higher taste stability and thus achieves longer shelf life.

■ Correct choice: sealing compound

The sealing compound is that element of the closure which comes into direct contact with the food, making it necessary for it to be chosen carefully. The most important points which need to be taken into account in selecting the correct sealing compound are:

- raw materials purity;

- composition of the material (here it is a matter of “what is in should stay in”);
- fulfilling the desired function.

Absence of due care in selecting the sealing compound can have a very great effect on quality of beer and, in an extreme case, can make beer undrinkable. Gas exchange through the seal of the closed container – CO₂ losses from beer or O₂ or TCA carry-over into beer – impairs quality of beer just as does a possible carry-over of taste-influencing substances which can pass from the seal into beer (fig. 1).

When ordering crown corks, filling operations should determine in all cases whether the sealing compound is suitable for the purpose intended (alcohol content, pasteurisation, hot filling etc.). As a rule,



Fig. 1
Problems with oxygen in beer

- taste impairment
- colour change
- hazes
- sources of oxygen in beer
- in solution in beer
- trapped during filling
- permeation after capping

Source: Grace



Author: Nico Engelhardt, Quality Manager, Rauh GmbH & Co. Blechwarenfabrikations KG, Kueps/Germany



Fig. 2 Incorrect centring, e.g. due to:

- bottle plate worn
- shard in forming element
- forming element worn
- cap top not concentric with bottom part



Fig. 3 Capping process incomplete, e.g. due to:

- capping head not travelling down sufficiently far
- height fluctuations of the bottle



Fig. 4 When head pressure is too low e.g. due to material fatigue or breakage of springs, CO₂ losses or oxygen ingress due to deficient capping can occur

conditions for use of closures are contained in the particular declarations of conformity. In commercial-scale production, it is, unfortunately, found again and again that declarations of conformity for closures make their way unread into the files. Accordingly, attention is drawn again to the importance of checking these.

For completeness' sake, it should be mentioned that special sealing compounds are available, having characteristics that are meant to protect especially sensitive products from taste influences.

On the one hand, there are sealing compounds with scavenger. These seals have the capability of absorbing oxygen in the bottle and oxygen entering from outside.

On the other hand, there are sealing compounds with barriers that, by means of their barrier effect, should reduce CO₂ loss and minimise ingress of e.g. O₂ and TCA. When using these sealing compounds, it is necessary to ensure that, in view of the hardness of the material, only bottles that have an absolutely perfect mouth are capped.

Paints and print colours have to be chosen such that they are approved and qualified for the particular application. Not just the correct selection of paints and print colours is of importance. Quality of application also plays a big role in subsequent use of finished closures. Low-pore imprinting, complete curing and optimal paint adhesion are some of the more important points.

Possibilities for mistakes in the capping process

Capping and tightness of the bottle is, in the last analysis, the most important point in ensuring that quality of beer is main-



Fig. 5 Tilting can arise where e.g.:

- bottle plate worn
- forming elements worn
- cap top and bottom part not synchronous
- glass shard jammed in forming element
- defective transfer

tained up to the end of shelf life. As a result, the capping process needs to be carefully inspected and checked by fillers. Small deficiencies in the capping process can have major consequences. Defective capping leads to CO₂ losses as well as to O₂ ingress and, thus, to taste impairment in the filled product. A regular check of capping should be part of every production-related inspection in any event. Operators on filling lines must be in a position to recognise potential deficiencies, evaluate and rectify them. Regular maintenance and servicing of lines can be regarded as basic prerequisite for an optimal capping process. Some typical deficiencies which can be repeatedly observed in filling operations are shown in figures 2 to 5.

Damaged bottle mouths

Bottles and their condition play a further decisive role. When looking at the quality of returnable bottles that are in circulation, in particular NRW bottles, one finds a very large portion having a greater or lesser degree of damage to the mouths. Bottle inspectors are in many instances not adequately fine-tuned for picking up damage and, in some instances, very marginal bot-

tles come into use. A reason for the inadequate settings of bottle inspectors is usually put down to the overall condition of the bottle pool. With various types of damage at the mouths, sealing compounds naturally reach their limits so that consumer complaints relating to leaking bottles, stale beer etc. are the order of the day (fig. 6, 7).

Proper storage of crown corks

The following should be taken into account in relation to storage conditions of crown corks: a relative air humidity of max. 60% should be maintained. With good ventilation, storage temperature should be between +5 °C and +35 °C. It is not unusual to find that closures come from very cold storage rooms and get on the bottle without pre-tempering. This can also lead to bottles leaking and CO₂ loss. It should be assured that closures are protected against sunlight, humidity and foreign odours. One can certainly imagine what the influence of e.g. a diesel fork lift truck would have on subsequent sensory properties. Damp cartons act as a sponge and provide excellent breeding grounds for diverse bacteria and moulds. Use of polybags inside cartons is recommended.

Focus on quality

Many experts in breweries and laboratories try, with increasingly fine analysis methods and the most modern equipment, to achieve continuous improvement in terms of quality and stability of beers. Much money is spent so as to be able to, ultimately, fill the perfect beer.

At this point, one has to ask oneself: what use is it brewing the perfect beer when, ultimately, the container cannot ensure that quality achieved through hard work can be maintained. Regardless of whether it is a bottle, a closure or the capping process, the container must preserve product quality. It is no good saving at the wrong place. ■

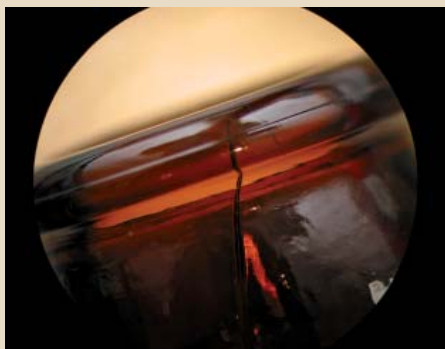


Fig. 6 Hairline cracks



Fig. 7 Chipping