

## Quality Assurance Wine Corks

# Confidence is fine, Quality Control is better!

*... is not just a catchphrase for us, we take it literally. We have integrated a whole range of checks into the production and finishing of GÜLTIG® quality corks for your and our own safety. Too much trouble and expense? Quite the contrary! We are convinced that such checks are essential, especially for a natural product on which extremely high technical demands are placed. In this practical guide, we would like to introduce you to the GÜLTIG® Quality System, which conforms to the Geisenheim Test Methods and Systecode requirements.*

GÜLTIG® quality corks are characterised by the fact that their production is accompanied by a comprehensive quality control system. This begins in the country of origin where the cork wood is purchased and continues throughout all stages of production right up to delivery to the bottling plant.

## Purchasing cork wood

GÜLTIG® ensures that defective cork wood does not enter the production chain by exploiting its skills in raw cork purchasing. By examining the colour and appearance of the cork slabs, our experienced buyers can determine its origin and the length of time it has been stored after being harvested.

Cork woods from different growing regions vary in quality. GÜLTIG® purchases its cork wood exclusively from the best regions. Our buyers thus ensure that cork wood is not purchased from forests with a high proportion of green wood or from areas increasingly infested with worms and ants.



Ideally, the cork should be stored in the forest for one year after peeling before it is processed. The thickness of the cork must be sufficient for the required bottle stopper diameter. Therefore, the cork slab must be 5 mm thicker than the desired cork diameter. Furthermore, the slab should have 9 annual rings (corresponding to the years of growth).

## Boiling the bark

The following factors are important for the boiling process:

- water purity
- temperature
- duration of boiling and
- water quality.

GÜLTIG® analyses the water prior to boiling in order to ensure the required water quality. Any harmful substances (chlorine) are then filtered off. Boiling the cork slabs takes 2 hours at a water temperature of at least 95° C. The solid residue in the boiling water must not exceed 6 g/l. The boiling water is changed daily regardless of this level.



## Storing the bark

In order to avoid the infestation of harmful mould, the cork slabs are only stored for a maximum of 14 days after boiling. The cork wood rests on hygienic plastic pallets in well-ventilated storerooms during this period.



## Cutting the bark into strips



During the cutting process, the cork slabs and strips are again inspected for worm and ant infestation as well as green wood. The cut strips must have the following dimensions:

- Thickness: at least 5 mm greater than the required cork diameter.
- Width: at least 2 mm greater than the required cork length.

## Punching out the blanks

The optimal location on the cork strip is chosen to ensure the visual quality of the raw corks. Corks are not punched out at any location with obvious growth defects. The raw corks are then measured. Their diameter must be at least 0.5 mm greater than required for the finished corks.

### Drying the raw corks

The raw corks are dried to a moisture level of below 7%. This level is monitored by measuring the electrical conductivity of the raw corks.

### Grinding

Grinding is performed to ensure that the sides are at right-angles and that the corks comply with the specified tolerances.

### Washing



The raw corks are cleaned and disinfected during the washing process. Any errors in this process are mostly irreparable. Experience and precision are therefore essential. The concentration of the substances in the water is checked daily before the start of the washing process. Any undesirable constituents are eliminated by filtering, if necessary.

The composition of the washing and bleaching liquid is based on a special GÜLTIG® formula. It is continuously monitored with an aerometer. The washing liquid is changed regularly depending on the quantity of corks washed. This ensures that all of the corks are cleaned and bleached uniformly. Automatic time clocks are used to control the progression of the washing process. They are regularly checked before the system is started up.

### Drying



The wet corks, once washed, must be dried quickly but gently from the inside outwards. They will have a moisture content of less than 7% when they leave the drying chambers. This is again checked by measuring their electrical conductivity.

### Grading



The corks are sorted several times both visually (manually) and electronically (by machines). Any defective corks are eliminated at this stage.

At the same time, the corks are sorted into GÜLTIG® quality categories. This process is continuously monitored by means of standard quality samples.

### Incoming inspection

#### ● Defects

The following are defined as defects:

- Green wood over a specified length, width and depth.
- Fractures or cracks over a specified length and depth.
- Woody or swollen parts over a specified length and depth.
- Insufficient number of annual rings.
- Cutting marks.
- Chipped ends.
- Worm and ant holes.

The number of samples to be inspected for the above-mentioned defects is not specified in the DIN ISO 2859 standard. As a matter of principle, we check 1.000 corks per lot irrespective of the size of the batch.

#### ● Dimensions

The length and width dimensions are defined in our GÜLTIG® specification. It allows the following tolerances:

#### GÜLTIG® specification

Length	Diameter
+ 1.0 mm	+ 0.6 mm
- 0.5 mm	- 0.4 mm

#### ● Visual quality

In order to check the visual quality, 20 corks are taken from each sample and placed in transparent sample boxes with their less aesthetic side facing upwards. They are then compared with available control samples. The visual quality of the opened bales is also checked. Furthermore, in order to objectify the visual quality check, we also use a grading machine specially developed for us. The optimal quality is determined using a video camera.



#### ● Oxidation

All GÜLTIG® corks are cleaned with peroxide and not with chlorine. In order to avoid oxidation of wine with peroxide, we check all batches for any possible remaining peroxide. 10 corks are immersed in an indicator solution for 1 hour. Any change in the colour of the test strips is unacceptable since this indicates a risk of oxidation.



#### ● Test for off-odours

The aim of this test is to detect any off-odours caused by the corks as early as possible. For the purposes of comparison, 100 ml glass jars with screw lids are filled with 3 ml of distilled water (which has been filtered through activated charcoal) and then sterilised. Then one cork is put into each jar under sterile conditions. Sensory evaluation of the jars takes place after 24 hours of storage at room temperature. A glass jar containing 3 ml of water but no cork is used as a benchmark.



### ● Trichloranisol (TCA)

2,4,6 Trichloranisol (TCA) is the main substance responsible for corkiness. This was established in 1981 by the Swiss scientists Tanner, Zanier and Buser, and then confirmed again and again by oenologists worldwide.

A reliable monitoring system for determining the quantity and intensity of TCA has been in use at Heinrich Gültig GmbH Heilbronn since the beginning of 2002: Solid Phase Micro Extraction – SPME, in association with a gas chromatograph and a mass spectrometer. (GC/MS). We use this system around the clock.



This test involves soaking corks in 10% alcohol for 24 hours. The soaking liquids are poured into small vials which are then sealed. The vials are heated in a measuring device while in constant movement. A solid fibre in the upper part of the vial absorbs the released TCA. The fibre is then desorbed at a higher temperature in the gas chromatograph. The quantity and intensity of the TCA – if present – can be determined with exactitude. The inspected cork batches exceeding the limit value set by us will undergo a second test. If this also provides a negative result, the lot will then be rejected.

### ● Moisture

The corks that have been gently dried in Portugal leave our plant there with a moisture content of below 7%. They must not absorb more than 1% moisture during transportation. Any corks that reach Heilbronn with a moisture level of above 8% are rejected.

### ● Quantity

All of the corks are counted to determine the exact quantity in each bale.

Only corks which pass all of the above-mentioned tests are released for further processing.

## In-process tests and inspections

### ● Printing

The printing process has a kind of bottleneck function. During this process, the corks are individually checked before further processing takes place. The tests conducted are:

1. During set-up, the technician and the operator check that the printed text and/or printing plate is correct.
2. Continuous visual inspection of the cork quality whilst the automatic printing machines are being filled and during printing itself.
3. Automatic checking of the dimensions of each cork in the printing machine.
4. The operator checks that the applied printing is clearly legible.
5. Checking the exact quantity of corks for each order.

### ● Moisture of the corks

The required moisture level (%) differs according to the technical bottling line conditions and customer specifications. The moisture is adjusted to the specified level in specially developed cork drying chambers.

**Moisture control is subject to considerably stricter standards than those specified in the DIN ISO 2859 standard.**



**Max. deviation  
± 1.5 %**

### ● Impregnation, sterilization and packing

Impregnation and sterile packaging are both fully automated. We therefore check the automatic metering systems daily before start-up for exact times and metered quantities.



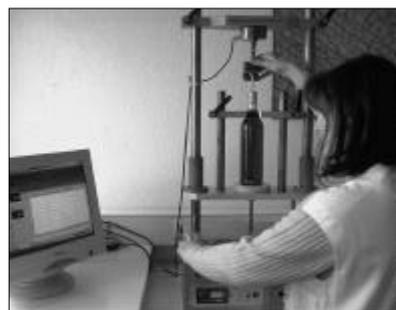
## Pre-delivery or final inspections

Whereas the tests and inspections described above concern the raw materials and semi-finished products, the pre-delivery or final inspections deal with the finished products.

### ● Extraction force

The corks are inserted into standard DIN bottles with a vacuum. The extraction force is then measured after 24 hours of vertical storage at a temperature not exceeding 10° C.

**Required force  
300 N ± 150**



### ● Moisture

The moisture of the corks is checked again as part of the pre-delivery inspection.

### Additional tests (optional)

#### ● Dust test

10 corks are introduced into a bottle which is then filled with water. The bottle is shaken once, and the water is then poured out and filtered through a 0.65 µm membrane filter. The filters are compared with control membranes determined by GÜLTIG® following long series of tests.



#### ● Sterility

The first „wine-sterile“ cork was developed by GÜLTIG® in the 1950s and then patented worldwide. The sterility test is conducted by incubating corks on a culture medium. In this test, 5 ml of malt extract broth is put into 100 ml jars with screw lids and then sterilised. Then a cork from the batch to be tested is added to each

bottle under microbiologically sterile conditions. The bottle is given a single vigorous shake before being heated in the incubator for 48 hours. The evaluation then follows immediately. Slight hazing of the culture medium and/or slight fouling due to white mould developing on the cork surface during the test should not be considered as reasons for rejection.



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