

NATURAL Cork User Group

Working together with the Trade and the Cork Industry

INTERNATIONAL GUIDE for BUYING CORK STOPPERS for STILL WINES

(Minimum Standard)

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3. DEFINITIONS AND TERMINOLOGY

Terminology	Definition*
Agglomerated cork stoppers	ISO FDIS 633 — cork stopper obtained from mixing cork granules with addition of an adhesive.
Natural cork stoppers	ISO FDIS 633 — cork stopper totally made from natural corkwood.
Natural colmated cork stoppers	<p>ISO FDIS 633 — cork stopper made from natural corkwood.</p> <p>NOTE: Natural cork stoppers having been colmated (operation that consists in sealing the lenticels of the cork stoppers and/or disks with a mixture of glue and cork powder coming from finishing cork stoppers) commonly receive the designation of colmated cork stoppers.</p>
New generation agglo cork stoppers	ISO FDIS 633 — stopper obtained by agglutination of cork granulates, grain size between 0,25 mm and 8 mm, with addition of an adhesive and having, at least 51 % of cork granulate (mass). prepared following a procedure that intends to improve its sensorial neutrality and may contain expanded synthetic materials
N+N (One plus One or Technical cork stoppers)	<p>ISO FDIS 633 — stopper with an agglomerate cork body and n disks of natural corkwood glued on one or both ends.</p> <p>NOTE: In this designation n indicates the number of disks used.</p>
Multi-piece natural cork stoppers	ISO FDIS 633 stopper obtained from several pieces of natural corkwood glued together.

*For further definitions see ISO 633 Cork – Terms and definitions

Terminology	Definition
Bottle diagram	Diagrammatic specification of the bottle design
C.E.T.I.E	Centre Technique International de l'Embouteillage (International Technical Center for Bottling)
Shelf life	The period of time after bottling after which the quality of the wine maybe impaired.
British Retail Consortium (BRC)	A Trade Association for the United Kingdom retail trade.
The Packaging Society (IOP)	Organisation that represents packaging professionals
The Wine and Spirit Trade Association	A trade association representing the UK wine and imported spirit sectors

4. INTRODUCTION

In October 2002, retailers, wineries and the cork industry met to discuss how to improve quality standards within the cork industry and agreed to develop a technical forum called the Natural Cork User Group (NCUG) which met for the first time in May 2003.

One of the ways to improve quality was to develop a document for providing guidance for buying cork stoppers for still wines; a Working Group was established in May 2004 for this purpose. The aim of the Guide is to develop a common understanding of quality parameters throughout the supply chain of the cork industry. If used properly, the guide will assist in the procurement of cork stoppers for still wines by providing a common reference document for the Buyer (client, winery, packaging / bottling site) and the Seller (manufacturer of corks, producer, or supplier of corks or agent). The Guide is designed to inform rather than act as the basis of a contract between the Seller and Buyer.

The cork industry has supplied the global wine trade with stoppers for about 300 years using the bark from the cork oak *Quercus suber* L. The cork oak has many unique characteristics that distinguish it from other species of oak, in particular the ability to regenerate the outer layer of bark after it has been stripped. The main population of cork oaks is found in the Western Mediterranean basin, particularly in the Montado forest of Portugal and Dehesas in Spain; cork oaks are also grown in Italy, Morocco, Algeria, Tunisia and France.

For a typical cork oak, the first stripping of bark, known as 'Virgin Cork', normally occurs after about 25 years; it is only on the third stripping that the bark is suitable for the production of cork stoppers. Subsequent strippings take place every 9 years. The average life span of a cork oak ranges from 150 to 200 years, and it can have up to 16 harvest periods during that time. The forests are well managed and good husbandry practices are maintained. They are described in the International Code of Subericulture Practices (Suber code).

The cork forest harvesting techniques and legislation governing harvesting are not covered within the Guide. For further information on harvesting please refer to the C.E.Liège in *Section 15: RELEVANT CONTACTS*

Cork tissue has a unique cellular structure which makes cork impermeable, light, compressible and elastic. Cork can also be recycled and renewed thus helping to sustain the natural environment. For example, cork can be recycled by grinding and the cork granulates produced

can be used in other products, such as wall panels, gaskets, shoe soles, and fish floats.

Cork is a natural product well appreciated by the consumer and has established a special relationship with wine over the past three centuries. Market research during 2004 and 2005 in the United Kingdom, Australia and United States of America indicated that over 60% and 69%, respectively, of consumers in these key markets prefer wines sealed with a cork stopper, and that the type of closure is an important factor when consumers choose a bottle of wine.

It is recognized that:

- a cork stopper provides a good seal, maintaining the wine in good condition throughout its shelf life; and
- a cork stopper is resilient and its cellular structure allows application to a wide range of narrow neck containers.

Wine cork stoppers covered by this guide can be grouped into the following categories:

- i. natural cork stoppers;
- ii. natural colmated cork stoppers;
- iii. multi-piece natural cork stoppers;
- iv. technical cork stoppers (also known as 'one plus one' or 'N plus N');
- v. agglomerated cork stoppers; and
- vi. new generation aggro cork stoppers.

Definitions of the above categories of cork stoppers can be found in Section 3: DEFINITIONS AND TERMINOLOGY

For further information on cork manufacturing please refer to the C.E.Liège in *Section 15: RELEVANT CONTACTS* and to Annex 1 – Simple flow diagram of the manufacturing process of natural cork stopper.

5. SCOPE

The purposes of the *International Guide for Buying Cork Stoppers for Still Wines* are:

- to provide technical guidelines, including chemical, physical, microbiological and grading requirements, for buying cork stoppers, which satisfy the requirements of the wine producer and the bottler (packer) and which meet the expectations of the consumer (end users); and
- to ensure that cork producers are aware of the technical standards required by retailers and wineries.

This document concerns cork stoppers 'ready to use' for still wines produced according to the *International Code of Manufacturing Practices for Cork Stoppers*.

6. REGULATORY AND RECOMMENDED TECHNICAL STANDARDS COMPLIANCE

6.1 Compliance with legislation and regulations

Sellers must comply with current Regulations relevant to the production of cork stoppers including components, such as surface treatments, lubricants and glues throughout the supply chain. Particularly relevant are EU Regulation 1935/2004 on materials and articles intended to come into contact with food and the Council of Europe resolution ResAP(2004)2 on cork stoppers and other cork materials and articles intended to come into contact with foodstuffs.

6.2 C.E. Liège *International Code of Manufacturing Practices for Cork Stoppers*

Sellers must be certified in accordance with the relevant parts of the latest version of *International Code of Manufacturing Practices for Cork Stoppers* throughout the supply chain.

Use of the trade mark 'SYSTECODE' demonstrates such compliance; the trade mark has been registered at the Office of Harmonization in the Internal Market of the E.U. as a System of Quality and of certification for cork stopper manufacturers. Contracts and agreements should be established only with certified producers listed on the C. E. Liège website (www.celiege.com).

6.3 Hazard and risk management system

Sellers must be able to demonstrate a formal Hazard and Risk Management system throughout the manufacturing process and to ensure that all hazards to consumer safety and product integrity are identified and that appropriate controls are established and documented.

6.4 Quality management system and improvements

Sellers must be able to demonstrate a fully implemented quality system. It is recommended that they have achieved ISO 9001 or are working towards this standard or an equivalent. Where applicable it is recommended that the quality system achieves compliance with the British Retail Consortium (BRC) / The Packaging Society (IOP) Global Standard – Packaging or its equivalent.

7. HOW TO CHOOSE CORK STOPPERS

The choice of cork stopper is the responsibility of the Wine Buyer (the 'Buyer') and should depend on the performance expected of the cork stopper, characteristics of the wine and the type of bottle. In particular, the performance of the cork should take into account:

- protection of the wine during the projected shelf-life;
- requirements of the bottling line; and
- consumer expectations, i.e. the functionality of the cork.

Such knowledge will allow selection by the Buyer, in consultation with the Cork Seller (the 'Seller'), of stoppers of the correct type and where applicable grade, and of the appropriate physical, chemical and microbiological characteristics. While most of these latter characteristics relate to aspects of cork performance and are detailed in Section 8, the grade of cork is mostly dependent on the external visual characteristics of the cork. The visual characteristics of cork may be assessed by trained personnel and/or by machines.

7.1 Size of stoppers

A study of the internal profile of the bottle together with knowledge of the bottling conditions and the wine characteristics is recommended for determining the sizes of stoppers to be used.

7.1.1. Cork length

The length of cork selected must be in accordance with the bottle filling height. If the length of the cork is too great the headspace may be compressed forcing wine out of the bottle and causing the cork to lift after insertion. Equally the cork should not be so short as to leave an excessive headspace which, in some conditions, may contribute to the development of unfavourable sensory characteristics.

7.1.2. Cork diameter

Care should be taken to match the cork diameter with the internal profile of the neck of the bottle. For an EN12726 bottle neck, as a general guide, and for a natural cork stopper the minimum diameter of the stopper should be 5.5 mm greater than that of the mean nominal

through-bore of the bottle neck.

Other sizes of bottle neck diameter may be used, providing adequate consideration has been given to matching the dimensions of the cork with the diameter of the neck and its maximum and minimum through-bore. The glass bottle manufacturer should provide bottle diagrams and specifications in order to ensure compatibility.

7.2 Grading and ranges of cork stoppers

Cork stoppers are available in several ranges: top, medium, commercial and economic. Each range of stopper may include several categories and some categories may include several visual grades because there are natural variations in visual appearance (porosity and colour). The grade and/or type of stopper in each of these ranges are shown in the attached table (Section 7.3). Cork is a natural product so variations in visual appearance are normal. When judged visually different visual levels are available. Cork companies may supply different visual levels inside each range.

Natural and Colmated cork stoppers

There are generally 8 visual levels for natural cork stoppers. The grading of corks according to their visual characteristics has been important to the commercial sale of corks for most of the industry's history. There has been tacit agreement amongst Sellers and Buyers that cork visual characteristics, and to a lesser degree the length of the cork, relate to overall cork performance despite a lack of scientific evidence to support such a relationship. As a result, the price of corks is determined mainly by visual grade and length. More details on the grading of corks by visual characteristics and the criteria employed are provided in Section 8.

N + N corks

They are generally classified into 3 visual levels related to the natural cork disk's appearance called A, B and C. The range chosen depends of its intended use; higher ranges for higher quality wines and for those with a longer shelf life.

7.2.1 Grade accuracy

The Buyer and Seller should be able to validate the level in accordance with a reference representative sample.

7.2.2 Visual parameters

The following parameters are used to determine visual levels:

- porosity;
- cracks;
- bark; and
- belly.

7.2.3 Defects

Some defects may influence the cork stopper's functionality:

- longitudinal cracks from top to top;
- green spot;
- worm and ant hole;
- dry year; and
- channel.

7.3 Recommendation of the type of cork stopper range for wine

The following table shows which type of cork stopper might be used for which quality of wine. This is a recommended guide only and subject to contractual agreement between the Buyer and the Seller.

WINE CLASSIFICATION	RANGES OF STOPPERS																		
	Top			Medium			Commercial						Economic						
	Natural Cork visual levels (Flower, Extra, Super)			Natural Cork visual levels Super - 1°			Natural Cork visual levels 1°, 2° and 3°			Natural Cork visual levels 2° and 3°			Natural Cork visual level 3°			Natural Cork visual levels 3° and 4°			
							1+1 Cork stoppers visual levels A and B			Colmated visual levels 3° and 4°			Colmated visual levels 4°			Colmated visual levels 4° and 5°			
							New generation agglo cork stoppers			1+1 Cork stoppers visual level B			1 + 1 Cork stoppers: visual Levels B and C			1 + 1 Cork stoppers: visual Level C			
										New generation agglo cork stoppers			New generation agglo cork stoppers			New generation agglo cork stoppers			
										New generation agglo cork stoppers			New generation agglo cork stoppers			Agglomerated cork stoppers			
	Cork length (mm)																		
	54/53	49	45/44	49	45/44	38	49	45/44	38	49	45/44	38	49	45/44	38	49	45/44	38	
ICONIC	✓	✓	✓																
ULTRA PREMIUM	✓	✓	✓	✓	✓	✓													
SUPER PREMIUM				✓	✓	✓													
PREMIUM							✓	✓	✓										
POPULAR											✓	✓		✓	✓				
BASIC																		✓	✓

8. TECHNICAL CHARACTERISTICS

This section outlines the general physical (including visual), chemical and microbiological characteristics of cork stoppers in order to provide the technical information on which quality control tests are based. For each parameter an analytical method and a recommended value are proposed. For some parameters, different values are given for each range of cork stopper.

8.1 Sampling

All quality control methods must be based on a sampling procedure for a batch of corks agreed between the Seller and the Buyer

Method: A specific ISO standard for sampling is being developed.

8.2 Type / Grade specification

The buyer and cork supplier shall be able to validate the visual level by reference to an agreed representative sample.

8.3 Dimensions

Purpose: Dimensions are measured to ensure the correct specification is maintained as agreed with the Buyer. It is important to ensure the function of sealing the wine and adequate extraction of the cork stopper, while accounting for the issues addressed in section 7.1.1 and 7.1.2.

Method: ISO 9727-1 Cylindrical cork stopper – Physical tests – Part 1 Determination of dimensions.

Specification:

	Natural/Colmated	1+1/Agglo / New generation Agglo
Diameter	± 0,5 mm	± 0,3 mm
Length	± 1,0 mm	± 0,5mm
Ovality	0,7 mm max	–

Specification: ISO 3863:1989 (Dimensional Characteristics, sampling, packaging and marking) is being reviewed.

Definition:

Ovality - The mathematical difference between two measurements of the diameter in perpendicular cross section to each other. Ovality is measured to ensure the cork stopper is rounded for application during manufacturing and bottling.

8.4 Moisture content

Purpose: At low moisture values, the stopper loses its mechanical properties, while high moisture values may promote microbial growth.

Method: ISO 9727-3 Cylindrical cork stoppers – Physical tests – Part 3: Determination of moisture content

Specification:

All ranges 6 +/- 2%

Definition:

Moisture: The relative content of water in a mass of a cork

8.5 Liquid seal capability

Purpose: To ensure proper seal capability of the wine to prevent leakage.

Method: ISO 9727-6 Cylindrical cork stoppers – Physical tests – Part 6: Determination of liquid tightness

The liquid seal capability is expressed as the maximum internal pressure that the stopper can support in a bottle. The recommended values are as below:

Specification:

Range of cork stoppers	Liquid seal capability
Top of the range	at 1.2 Bar (120 kPa) internal pressure
Medium of the range	at 1.2 Bar (120 kPa) internal pressure
Commercial range	at 0.9 Bar (90 kPa) internal pressure
Economic range	at 0.9 Bar (90 kPa) internal pressure

8.6 Dimensional recovery after compression

Purpose: Good resilience enhances a good corking impermeability

Method: ISO 9727-4 Cylindrical cork stoppers – Physical tests – Part 4: Determination of dimensional recovery after compression

Corks are not capable of being compressed by more than 35% of their diameter (at 24 mm diameter the cork stopper must not be compressed to a diameter of less than 15.5 mm before and during insertion).

Specification:

All ranges: The recovery of the diameter after five minutes shall be greater than 90%.
--

Definition:

Recovery after compression: The ability of the cork stopper to return to its original diameter after being compressed.

8.7 Extraction force

Purpose: To ensure adequate extraction force is applied so that the cork stopper can be easily removed. The stoppers' hold should easily allow the normal insertion of the cork screw.

Method : ISO 9727-5 Cylindrical cork stoppers – Physical tests – Part 5: Determination of extraction force

Specification:

All ranges: The amount of force required to remove a 45 x 24 mm cork shall be between 15–45 daN . The value selected will depend on the projected life of the wine

Note: extraction measurements should be taken 24 hours after bottling.

Definition:

Extraction: The amount of force required to remove the cork stopper.

8.8 Peroxide residues

Purpose: Where used, a high level of residual peroxide may impact adversely on the level of sulphur dioxide in the wine.

Method: ISO 21128 Cork stoppers – Determination of oxidizing residues – Iodometric titration method.

Applicable for cork stoppers washed with peroxide.

Specification:

All ranges : Peroxide residues < 0.2 mg /cork

Definition:

Residual peroxide: The peroxide remaining in the cork after processing

8.9 Dust

Purpose: High levels of dust may have an impact on equipment performance and appearance.

Method: ISO 9727-7 Cylindrical cork stoppers – Physical tests – Part 7: Determination of dust content

Specification:

Range of cork stoppers	Cork dust (mg/cork) maximum permitted
Top	<1.5
Medium	<2
Commercial	<2
Economic	<2.5

Definitions:

Dust: Fine particles of natural cork material.

8.10 Capillarity

Purpose: The efficiency of the surface treatment is determined by a capillarity test.

Specification:

There should be no surface migration of wine up the cork surface when the bottom of the cork is in contact with a liquid, under standard conditions, and held in contact with the liquid for 24 hours at 20 +/- 2°C.

Method: ISO Standard is under consideration

8.11 Releasable TCA (2,4,6 trichloroanisole)

Purpose: TCA has been identified as one of several chemicals which contribute significantly to the perception of 'musty / mouldy taint'.

Method: ISO 20752 Cork stoppers – Determination of releasable 2,4,6 trichloroanisole (TCA)

Specification:

Range of cork stoppers	Releasable 2,4,6 trichloroanisole (TCA) for a maceration of 20 corks (ng/L)
Top	≤3
Medium	≤4
Commercial	≤4
Economic	≤ 4

Definition:

2,4,6 Trichloroanisole is a chemical compound resulting from microbiological activity in the presence of chlorophenols.

8.12 Microbiology

Purpose: Minimise the risk of microbial growth.

Method: ISO 10718 Cork stoppers – Enumeration of colony forming units of yeast, moulds and bacteria capable of growth in an alcoholic medium.

The development of microbiological flora on the cork stopper will not be supported in a matrix of alcoholic strength 10% v/v and a pH value 3.5 at a temperature of 30°C for 72 hours.

9. SURFACE TREATMENTS

Any design or treatment applied to the surface of the stopper shall be agreed between Seller and Buyer

Surface treatments are applied to lubricate the cork stopper to assist sealing, insertion during the bottling and cork extraction.

The quantity and composition of the surface treatment applied depends on customer requirements. Consideration should be given to the type of wine, shelf life, maturation period, type of bottle and bottling filling machine.

Paraffin/silicone surface treatments are commonly used. For wines destined for more than 18 months maturation in bottle, a paraffin coating should be applied first followed by a silicone coating.

Surface treatments shall be approved for food contact use. Printing of inks should be applied only to the cylindrical body of the cork.

Surface treatments shall comply with Chapter XI - Section 8.2 C.E.Liège *International Code of Manufacturing Practices for Cork Stoppers*.

10. ADDITIONAL INFORMATION

The following information is provided in order to alleviate any concern that the end customer may have about cork stoppers.

10.1 Genetically modified organism (GMO)

Cork stoppers do not contain any genetically modified materials.

10.2 Allergens

There are no known allergens within cork material. However, in order to assist preservation of the final corks in bags, sulphur dioxide may be injected. (see Section 11.2.6)

10.3 Animal testing

Materials intended for the manufacturing of cork are not tested on animals.

11. PACKAGING, TRANSPORT AND STORAGE

11.1 Packaging

Packaging and the quantity per pack (usually 1000 corks per bag) shall be agreed between Buyer and Seller. Generally the bags are supplied inside an outer case. Packaging in direct contact with cork stoppers shall be of food contact grade materials. Packaging shall meet legal requirements, plus other requirements agreed between Seller and Buyer

11.2 Recommendations for the outer case

11.2.1 Company/producer name

The outer packaging must clearly display the name of the company / producer.

11.2.2 Product name

The commercial name of the product and dimensions should be made clearly visible on the outer packaging.

11.2.3 Quantity

The quantity should be clearly labelled on the outer packaging.

11.2.4 Country of origin

The country of origin of the manufacturer of the cork stoppers should be identified on the outer packaging.

11.2.5 Cork mark logo

The use of the Cork mark logo is recommended -



11.2.6 Sulphur dioxide warning

Where applicable, bags must have a warning statement printed or labelled on its packaging that states:

Warning: Contains sulphur dioxide (allergenic substance).

11.2.7 Product code

Where applicable, a product code may be applied to the outer packaging or bag. The product code is product specific to ensure the correct product within the delivery and ordering instructions.

11.2.8 Bar code

Where applicable, a suitable bar code can be applied to either the packaging case or the bag following discussion between the Seller and the Buyer.

11.2.9 Store this side up

Where applicable, a directional arrow or the words *Store this way up* may be used to help ensure correct storage.

11.2.10 Outer carton specification and Buyer/company design

The outer carton shall be suitable to maintain integrity and suitability for use.

Specification should be maintained by the Seller

The standard Seller's design format for outer carton design shall be used, except where varied by verifiable mutual agreement between the Seller and the Buyer.

11.3 Storage

11.3.1 Shelf life of corks

Corks should be used within 6 months of being packed by the seller. This may be varied by mutual consent of the Buyer and the Seller. The packing date should be shown on the outer packaging.

11.3.2 Storage conditions of corks

a. Storage instructions for corks

It is recommended that storage instructions be printed on the outer packaging.

b. Storage conditions of corks

It is recommended that corks should be kept in their original packaging until required for use. Corks remaining from bags at the end of a production batch must be kept in appropriated conditions (avoiding contamination and maintaining quality parameters of cork stoppers), and used within a maximum period of one week.

It is recommended that:

- corks should be stored in a ventilated and cool dry place with a stable temperature between 15°C (59°F) and 20°C (68°F) and a relative humidity of between 40% and 70%;
- corks should be stored in an odour free place and kept away from mould, all types of fuel and chemical products (such as cleaning materials and inks);
- corks should be stored in places where there are no chlorine or other halogenated-treated wood or halogenated products, such as newly constructed roof structures or treated pallets; and
- the polyethylene bags holding the cork stoppers should be opened only upon use. In general, the corks are sealed in gas barrier bags, sanitized with sulphur dioxide (SO₂). This gas acts simultaneously as an antiseptic, preservative and an antioxidant, thus protecting the cork.

11.4 Transportation of corks

Cork stoppers shall be transported in accordance with the *International Code of Manufacturing Practices for Cork Stoppers*.

12. TRACEABILITY AND IDENTIFICATION OF THE BATCH

Cork products and materials must comply with EC Regulation EC N° 1935/2004.

12.1. Traceability of materials and articles

The traceability of materials and articles shall be ensured at all stages in order to facilitate control, the recall of defective products, consumer information and the attribution of responsibility.

12.2. Systems and procedures

With due regard to technological feasibility, business operators shall have in place systems and procedures to allow identification of the businesses from which and to which cork stoppers and materials or articles and, where appropriate, substances used in their manufacture are supplied. That information shall be made available to the competent authorities on demand.

12.3. Materials and articles introduced onto the market

The materials and articles which are placed on the market in the Community shall be identifiable by an appropriate system which allows their traceability by means of labelling or relevant documentation or information.

13. CORK STOPPER IDENTIFICATION

Preferably consumers should be able to identify the nature of the stopper at the time of purchase.

14. REFERENCES AND ISO STANDARDS

14.1. E.U. Documents

Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food.

Resolution ResAP (2004) 2 on cork stoppers and other cork materials and articles intended do come into contact with food.

14.2 C.E.Liège Documents

International code of cork stoppers manufacturing practices, version 5, C.E.Liege 2006.

International code of subericulture practices, 1st edition, C.E.Liege 2005.

14.3 C.E.N Standards

EN 12726:2000 Packaging — Cork mouth finish with a bore diameter of 18,5 mm for corks and tamper evident capsules.

14.4 ISO Standards

ISO/FDIS 633: Cork - Vocabulary

ISO/DIS 9727-1: Cylindrical cork stoppers -- Physical tests -- Part 1: Determination of dimensions

ISO/DIS 9727-2: Cylindrical cork stoppers -- Physical tests -- Part 2: Determination of mass and apparent density for agglomerate cork stoppers

ISO/DIS 9727-3: Cylindrical cork stoppers -- Physical tests -- Part 3: Determination of humidity content

ISO/DIS 9727-4: Cylindrical cork stoppers -- Physical tests -- Part 4: Determination of dimensional recovery after compression

ISO/DIS 9727-5: Cylindrical cork stoppers -- Physical tests -- Part 5: Determination of extraction force

ISO/DIS 9727-6: Cylindrical cork stoppers -- Physical tests -- Part 6: Determination of liquid tightness

ISO/DIS 9727-7: Cylindrical cork stoppers -- Physical tests -- Part 7: Determination of dust content

ISO 10106:2003: Cork stoppers -- Determination of global migration

ISO 10718:2002: Cork stoppers -- Enumeration of colony-forming units of yeasts, moulds and bacteria capable of growth in an alcoholic medium

ISO 20752:2007: Cork stoppers -- Determination of releasable 2, 4, 6-trichloroanisole (TCA)

ISO 21128:2006: Cork stoppers -- Determination of oxidizing residues -- Iodometric titration method

ISO 22308:2005: Cork stoppers -- Sensory analysis

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16. ANNEX 1

Simplified Flow Diagram of the Manufacturing Process of Natural Cork Stoppers

Storage of cork planks	<ul style="list-style-type: none"> • Period (at least 6 months) during which the planks are stored outside stabilizing before be submitted to boiling.
Boiling the planks	<ul style="list-style-type: none"> • Immersion of planks in clean boiling water to clean the cork bark, to extract water soluble substances, to increase the thickness, to improve cork flexibility and elasticity.
Sorting cork planks	<ul style="list-style-type: none"> • The planks are sorted into several thicknesses and visual aspect according to their future use.
Stripping	<ul style="list-style-type: none"> • To prepare cork bark for punching.
Punching	<ul style="list-style-type: none"> • Cutting of cork bark by punching to obtain a cylindrical cork stopper.
Dimensional rectification	<ul style="list-style-type: none"> • Mechanical operation of polishing stoppers ends and/or roule (cork body) to assure dimensional specifications of cork stoppers.
Washing	<ul style="list-style-type: none"> • Process of washing cork stoppers using hydrogen peroxide or peracetic acid (these compounds are the most commonly used) to clean and disinfect cork stoppers.
Drying	<ul style="list-style-type: none"> • Operation that assures that the cork stoppers have a moisture content consistent with good mechanical behaviour and microbial stability.
Sorting cork stoppers	<ul style="list-style-type: none"> • The cork stoppers are scanned to eliminate imperfections detrimental to a perfect bottling and to grade cork stoppers to specific visual levels.
Branding and coating	<ul style="list-style-type: none"> • After the final (visual) selection, the cork stoppers may be printed according to buyer's specifications and supplier traceability procedures, via roller marking, ink marking or traditional branding. • After branding, they are given a final coating of paraffin or silicone, to make them easier to insert and extract from the bottles, while at the same time improving their sealing capacity.
Packaging	<ul style="list-style-type: none"> • Finally, corks are automatically counted, sanitised with sulphur dioxide gas and sealed in gas-barrier bags. • Packaging finished corks in SO₂ bags to avoid contamination during shipping.

