

HACCP GUIDANCE NOTES
FOR TEA PRODUCERS AND PROCESSORS
IN THE COUNTRY OF ORIGIN

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1. INTRODUCTION

Tea, *Camellia sinensis*, has been imported into Europe for in excess of 200 years with few, if any, reported safety concerns and has consequently been deemed to be 'low' risk in terms of food safety.

Tea is an agricultural product that is predominantly grown and manufactured in developing countries. It is sold on the world market either by Public Auction or Private Treaty (either directly by the producer or via a broker or trader). It is generally impractical for the European Packer to exert any direct control over the tea manufacturing process or to directly control food safety issues addressed during the process.

EU Regulation 852/2004 concerning the hygiene of foodstuffs places an obligation on food business operators to ensure that all stages of production, processing and distribution of food under their control satisfies the relevant hygiene requirements laid down in the Regulation.

The Regulation requires that food business operators put in place, implement and maintain a permanent procedure or procedures based on Hazard Analysis and Critical Control Point (HACCP) principles. This requirement will apply to tea processors carrying out any stage of production, processing and distribution of food **after** primary production and associated operations.

Procedures based on the HACCP principles should not initially apply to primary production of tea but food hazards present at the level of primary production and associated operations should be identified and adequately controlled to ensure the achievement of the objectives of the Regulation.

Tea imported into the EU is subject to the requirements laid down in this Regulation.

These guidance notes have therefore been produced by the European Tea Committee for use by its members to:

- Facilitate a common approach to discharging their food safety responsibilities,
- Assist in discussions with national authorities regarding compliance with the EU Regulation No 852/2004 on the hygiene of foodstuffs in relation to manufactured tea, i.e. their primary raw material and, if appropriate,
- Produce national guides or codes of practice.

2. SCOPE

These guidance notes apply to green, black, white and oolong tea from the plant, *Camellia sinensis*. They apply to tea primary production and associated operations, tea processing in the country of origin and transport to the European Packer.

In this document the following definitions apply:

- *Primary production* encompasses the growing and harvesting of the tea but does not include any other steps which substantially alter the nature of the tea.
- *Associated operations* encompass the transport, storage and handling of teas at the place of production, provided that this does not substantially alter their nature, and the transport operations to deliver teas, the nature of which has not been substantially altered, from the place of production to an establishment.
- *Processing* means any action that substantially alters the tea, including heating and drying and covers all activity subsequent to primary production and associated operations, including transportation to the European packer.

All processing steps subsequent to receipt by the European packer are excluded from the scope of these guidance notes.

Infusions prepared from other plants that are sometimes generically referred to as 'teas' are

specifically excluded from the scope of this guide; these raw materials are the subject of specific guidance notes prepared by the European Herbal Infusions Association. Decaffeinated and instant teas are, for the purposes of this guide, defined as *processed teas* and are outside its scope.

3. TEA MANUFACTURE

Tea manufacture is essentially a batch process; the process steps relating to the primary production and processing of black, green and white tea are detailed in Appendices 1,2 & 3.

4. DESCRIPTION OF POTENTIAL FOOD SAFETY HAZARDS

Tea is used for the preparation of a beverage by infusing the dry leaf in water; in most cases, boiling water is used but cold water can be used particularly when preparing 'iced tea'. Using the principles of the HACCP system each process step has been considered and as an illustrative example only, potential food safety hazards resulting from primary production and processing of tea identified; these are:

- Chemical contamination
- Foreign matter
- Microbiological contamination

HACCP principles should be applied by local processors to each specific processing operation separately in order to conduct a hazard analysis and to consider any measures to control identified hazards.

Chemical Contamination

Excluding accidental or deliberate contamination, the critical limits for chemical contamination are those given in EU and national legislation^{3,4 & 5}. Where national legislation differs from EU legislation and provides for limits that are more stringent, these should take precedence regardless of whether these legislative limits apply to the producing country or the country of sale.

The absence of a legal limit does not preclude individual packers setting limits for additional contaminants in line with their company policies.

Chemical contamination can arise because of environmental pollution, inappropriate use of agrochemicals, sabotage, adulteration, lubricants from tea processing machinery, fumigant residues from the fumigation of containers and contamination during transport or storage.

No naturally occurring constituents of tea have been identified which are likely to present a safety risk requiring control measures.

- Environmental pollution may for example result in enhanced levels of heavy metals from a variety of sources, e.g. nearby industry, traffic on nearby roads.
The available literature and in-house monitoring by European tea packers clearly demonstrates that the incidence of high levels of heavy metal contamination is low with the levels found rarely exceeding the limit values and hence heavy metals present only a very low food safety risk.
- Agrochemicals may be present because of the use of non-approved chemicals or their use without adherence to Good Agricultural Practice (GAP).
The monitoring of 'pesticide' residues by the trade shows that for most origins, values exceeding the current legal maximum residue levels (MRLs)³ are rare and hence do not compromise food safety. In some origins, residues exceeding the MRLs values are detected and in these instances the teas are not purchased as to do so would be illegal. As a result, the food safety risk from agrochemicals is considered to be low.
- The polycyclic aromatic hydrocarbon (PAH) content of most teas is below the limit of detection of current analytical methodology as evidenced by trade summaries of in-house generated

data. Some teas, notably Lapsang Souchong, are 'smoked' as part of their processing and contain measurable levels of PAHs; given that most of the PAHs present are relatively insoluble in water and as a consequence their levels in the infusion as consumed are much reduced it is considered that they present only a very low food safety risk.

- Toxic substances can be present as a result of accidental or deliberate contamination. From time to time, there have been warnings that teas have been deliberately contaminated in the country of origin. In the past ten years, there have been two such instances and despite intensive checks both at source and by the packers on receipt, no contamination has been found. Given that warnings have been issued when deliberate contamination has been threatened and the fact no contamination has been found it is considered that the risk of chemical contamination by deliberate contamination is low.
- Chemical contamination resulting from lubricants, fumigation of containers, transport and storage are known but occur infrequently and thus presents a low risk in food safety terms.
- Instances of adulteration are rare and traditionally tea quality is assessed by tea tasters who base their judgements on subjective assessments of the leaf before and after infusion and the appearance, odour and taste of the liquor, rather than by reference to its chemical composition. However certain chemical characteristics have been defined and given in an International Standard.⁶ The parameters given in this Standard are helpful if the tea exhibits abnormal characteristics or adulteration is suspected.

Foreign Matter

Foreign matter may be extraneous material naturally associated with tea, e.g. parts of other plants growing nearby, or foreign material introduced during the process, e.g. stones, glass, metal, scale, insect fragments, jewellery, packaging materials etc.

While there are various steps in the manufacturing process designed to remove foreign matter, teas received by European packers can contain a variety of extraneous matter. The quantity present is very low and its nature presents little food safety risk. This low risk is further reduced when considered in conjunction with the cleaning processes employed by the European packer and the manner in which the consumer prepares the beverage.

Microbiological Contamination

There are no reported microbiological food safety hazards relating to tea.⁷ Tea contains a natural level of micro-organisms but as it has a low water activity, these present negligible hazard providing the tea is kept dry. The European Union's Scientific Committee on Food reviewed the micro-biological risks associated with tea in 1997 and concluded that: *Tea has a long history of safe use and the Committee is unaware of any safety problems related to moisture in tea. This may be attributed to its low moisture content (i.e. low water activity) and the high content of anti-microbial substances. Moisture levels up to 10% seem to give an acceptable safety margin for the storage of tea.*⁸

5. MEASURES TO BE APPLIED BY THE LOCAL PRIMARY PRODUCERS TO MONITOR AND REDUCE/ELIMINATE POTENTIAL FOOD SAFETY HAZARDS

Local primary producers producing or harvesting teas are to take adequate measures as appropriate, in accordance with the guidance contained in Annex 1 of EU Regulation 852/2004:

- to keep clean and, where necessary after cleaning, to disinfect, in an appropriate manner, facilities, equipment, containers, crates, vehicles and vessels;
- to ensure, where necessary, hygienic production, transport and storage conditions for, and the cleanliness of, plant products;
- to use potable water, or clean water, whenever necessary to prevent contamination;
- to ensure that staff handling foodstuffs are in good health and undergo training on health risks;
- as far as possible to prevent animals and pests from causing contamination;
- to store and handle wastes and hazardous substances so as to prevent contamination;

- to take account of the results of any relevant analyses carried out on samples taken from plants or other samples that have importance to human health;
- to use plant protection products and biocides correctly, as required by the relevant legislation.
- to keep records on:
 - any use of plant protection products and biocides;
 - any occurrence of pests or diseases that may affect the safety of products of plant origin;
 - the results of any relevant analyses carried out on samples taken from plants or other samples that have importance to human health.

The primary producer may be assisted by other persons, such as, agronomists and farm technicians, with the keeping of records.

6. MEASURES TO BE APPLIED BY THE LOCAL PROCESSORS TO MONITOR AND REDUCE/ELIMINATE POTENTIAL FOOD SAFETY HAZARDS

It is expected that local processors adhere to the requirements of the EU Regulation 852/2004 on the hygiene of foodstuffs¹ and CODEX Recommended International Code of Practice – General Principles of Food Hygiene². These requirements are a prerequisite for the successful application HACCP.

EU Regulation 852/2004 gives guidance on general hygiene requirements for all food business operators, including the following:

General requirements for food premises

Specific hygiene requirements in rooms where foodstuffs are prepared, treated or processed

Transport

Equipment requirements

Food Waste

Water supply

Personal hygiene

Provisions applicable to foodstuffs

Provisions applicable to the wrapping and packing of foodstuffs

Training

A HACCP system should be implemented and operated by local processors in accordance with the guidance set down in the Annex to the CODEX document HACCP System and Guidelines for its Application².

The HACCP system, which is science based and systematic, identifies specific hazards and measures for their control to ensure the safety of food. HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end-product testing. Any HACCP

system is capable of accommodating change, such as advances in equipment design, processing procedures or technological developments.

The HACCP system consists of the following seven principles:

PRINCIPLE 1: Conduct a hazard analysis.

PRINCIPLE 2: Determine the Critical Control Points (CCPs).

PRINCIPLE 3: Establish critical limit(s).

PRINCIPLE 4: Establish a system to monitor control of the CCP.

PRINCIPLE 5: Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.

PRINCIPLE 6: Establish procedures for verification to confirm that the HACCP system is working effectively.

PRINCIPLE 7: Establish documentation concerning all procedures and records appropriate to these principles and their application.

The application of HACCP principles consists of the following logic sequence of tasks.

1. Assemble HACCP Team
2. Describe Product
3. Identify Intended Use
4. Construct Flow Diagram
5. On-site Confirmation of Flow Diagram
6. List all Potential Hazards; Conduct a Hazard Analysis; Consider Control Measures
7. Determine Critical Control Points (CCP)
8. Establish Critical Limits for each CCP
9. Establish a Monitoring System for each CCP
10. Establish Corrective Actions
11. Establish Verification Procedures
12. Establish Documentation and Record Keeping

The CODEX document HACCP System and Guidelines for its Application² should be consulted for a complete description of the requirements and implementation of HACCP.

The precise hazards identified and their control will be dependant upon the results of local processors hazard analysis, however the following illustrate the types of controls that may be appropriate to implement:

Chemical contamination.

In addition to the prerequisite hygiene controls concerning the use chemicals in the growing and production environment it may be appropriate to regularly measure and record sensory parameters, such as visual appearance, odour and taste, of the tea during production to check for malicious or accidental chemical contamination of the product.

Foreign Matter

Measures to remove foreign matter with sieves and ferrous material with magnets before blending and packing together with frequent monitoring of these devices are likely to be appropriate.

Microbiological Contamination

Excess moisture is the main issue relating to the development of microbiological contamination of tea. Visual inspection in combination with regular checking and recording of moisture levels during production against a critical limit, together with appropriate action where a trend towards loss of control is observed will help control the hazard.

7. MEASURES TO BE APPLIED BY THE EUROPEAN PACKER TO MONITOR AND REDUCE/ELIMINATE POTENTIAL FOOD SAFETY HAZARDS

7.1 PREFACE

The first points at which food safety hazards may be identified are, for the most part, at the producing factory in the country of origin and it is there that the monitoring activity and corrective actions should occur. While there is growing evidence that hygiene standards in tea factories are improving, the European Tea Trade recognizes that it cannot entirely devolve its responsibilities for food safety to the producers of the primary raw material. Tea Buyers may frequently visit the producers but they can only inspect/audit a tiny fraction of the many thousands of tea gardens and tea factories. For this reason it is recommended that the European packers' in-house quality programmes encompass suitable checks on the tea as received to ensure compliance with their legal obligations relating to food safety and to demonstrate 'due diligence'.

7.2 DESCRIPTION OF MEASURES

Chemical Contamination

Although hazard analysis shows that the risk of chemical contamination is low it is recommended that European packers carry out checks for chemical contamination on teas as received, either on selected

batches and/or against a predefined audit programme as part of due diligence programme rather than HACCP. The testing frequency should be based upon the origin of the tea, the risks posed and other information in their possession, e.g. whether there were known problems either with the transport used or at the storage facilities (such as fumigation of containers or storage facilities).

In the case of pesticides, the results of the analyses performed by European packers are collated and an annual summary prepared. Similarly, members of the trade share information on other chemical hazards that might be present. The collation of data in both these areas facilitates wider coverage of teas on the world market than would be possible by one company on its own and ensures that issues are rapidly identified and addressed by the trade as a whole.

When chemical contamination as the result of a deliberate act is suspected agreed trade wide measures are implemented both in the country of origin and on receipt by the packers to ensure that appropriate checks are carried out to ensure that any food safety risk is identified and eliminated. These measures should be agreed with the Packer's national authority responsible for food safety; for example in the UK the measures to be taken would be agreed with the Department for the Environment and Rural Affairs and the Food Standards Agency.

Foreign Matter

The presence of foreign matter in tea as received is likely and would, if not removed, provide a low food safety risk. Measures to remove foreign matter are implemented by the European packers as part of their HACCP programme. i.e. after emptying the tea from the chests it is cleaned (passage across sieves and past magnets) before blending and packing.

Microbiological Contamination

Excess moisture is the main issue relating to microbiological contamination. The moisture content of tea on receipt by the European Packer is below the 10% safety level suggested by the EU, typically it is within the range 4-7%, and hence checks on moisture content and microbiological load are unnecessary.

Should a package become wet mould growth may occur, this results in taints and thus the tea is unacceptable on quality grounds. The presence of excess moisture will normally be apparent as the packaging will show signs of water damage and the tea will contain large lumps of mouldy tea.

Individual companies may have in-house standards for monitoring purposes and European packers are recommended to carry out checks for moisture content and microbiological load on teas as received against a predefined audit programme as part of due diligence programme and quality monitoring rather than HACCP.

REFERENCES

1. Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs. Official Journal of the European Communities L226/3.
http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/oj/2004/l_226/l_22620040625en00030021.pdf
2. Recommended International Code of Practice – General Principles of Food Hygiene including Annex on Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its Application. Codex Alimentarius Commission CAC/RCP1-1969, Rev 4-2003.
http://www.codexalimentarius.net/download/standards/23/CXC_001_2003e.pdf
3. Council Directive 90/642/EEC of 27 November 1990 on the fixing of maximum levels for pesticide residues in and on certain products of plant origin, including fruit and vegetables. (as amended).
4. UK Arsenic in Food Regulations 1959 – SI 1959 No.831 (as amended).
5. UK Tin in Food Regulations 1992 – SI 1992 N.496
6. International Standard ISO 3720 –1977 Black Tea - Specification
7. The Microbiological Safety and Quality of Food, Aspen Publishers, Inc. Gaithersburg, Maryland 2000, Volume 1 Chapter 6 p960-964
8. Scientific Committee on Foods, European Union (1997). Opinion on the potential microbiological risk arising from the presence of moisture in tea (expressed on 19th September 1997)

APPENDIX 1

Primary Production and Processing of Black Tea

Primary Production and Associated Operations:

GROWING

Approved agrochemicals may be applied.

PLUCKING

Tender green shoots/leaves harvested

TRANSPORT to FACTORY

Green leaf transported to the Tea Factory

Tea inspected for 'quality' prior to entry into the factory

Processing:

WITHERING

Green leaf spread to a depth of about 10 cm onto troughs which generally have a perforated base; cold or warm air is blown through the leaf for 12-18 hours; during withering the factory staff remove any obvious foreign material and during withering small particles adhering to the surface of the leaf can fall through the base of the trough with the agitation caused by the blowing of air through the leaf and the periodic manual turning of the leaf.

SIFTING

Withered leaf is generally passed across sifters and over magnets.

MACERATION

Withered leaf is macerated (Rotorvane/Lawrie Tea Process/Cut Torn Crushed/Rollers) to tear the leaf and rupture the cells so releasing the enzymes necessary for fermentation.

FERMENTATION

Macerated leaf is held in warm, humid air for up to 2 hours.

DRYING

Fermented leaf is dried in a current of hot air which stops the fermentation and reduces the moisture content to below 3 %w/w

GRADING

The dry leaf is size graded by passing across electrostatic rollers, a series of sieves and winnowing apparatus.

PACKING

The graded tea is packed into containers for shipment (wooden tea chests, paper laminate sacks, polythene bags in gunny sacks or polythene bags in cardboard cartons).

APPENDIX 2

Primary Production and Processing of Green Tea

Primary Production and Associated Operations:

GROWING

Approved agrochemicals may be applied.

PLUCKING

Tender green shoots/leaves harvested

TRANSPORT to FACTORY

Green leaf transported to the Tea Factory

Tea inspected for 'quality' prior to entry into the factory

Processing:

ENZYME DEACTIVATION

The green leaf is heated to deactivate the enzymes.

DRYING

Deactivated leaf is progressively rolled, shaped and dried to reduce the moisture content to c. 3 %w/w

GRADING

The dry leaf is size graded by passing across, electrostatic rollers, a series of sieves and winnowing apparatus.

PACKING

The graded tea is packed into containers for shipment (wooden tea chests, paper laminate sacks, polythene bags in gunny sacks or polythene bags in cardboard cartons).

APPENDIX 3***Primary Production and Processing of White Tea******Primary Production and Associated Operations:*****GROWING**

Approved agrochemicals may be applied.

PLUCKING

Tender white shoots/leaves harvested

TRANSPORT to FACTORY

White is leaf transported to the Tea Factory

Tea is inspected for 'quality' prior to entry into the factory

Processing:**DRYING**

The fresh buds / leaves are thinly spread and allowed to dry naturally at ambient temperature to reduce the moisture content to c. 3 %w/w

GRADING

The dry leaf is graded by passing across a series of sieves, winnowing and colour-sorting apparatus.

PACKING

The graded tea is packed into containers for storage/shipment (vacuum packed cartons/sacks).

APPENDIX 4 – Generic Example of a HACCP plan for a Tea Blending Operation (For illustrative purposes only)

PROCESS STEP	HAZARD	PREVENTATIVE MEASURES	CCP No.	CRITICAL LIMITS	MONITORING		CORRECTIVE ACTION & RESPONSIBILITY
					PROCEDURE	FREQUENCY	
1 Teas and Herbs delivered to Original Stores from external source, Inspected and Stored	Fork Lift Mechanical Damage Pest Infestation Transit Damage Non Suitable Packaging, foreign bodies Environmental conditions	(Training pre requisite) (Ref pest control pre requisite) Goods in Checks Material Specification Sheet / Goods in Checklist Canopy / Goods in Checklist	No	No major visual damage to delivered products.	X101 X132 X085 X038 EX038	Each Delivery Each Batch	Product rejected and returned to supplier. Quality dept informed. Responsibility – Production/Quality
2 Tea unloaded, Inspected and Stored as Blend Kits	Fork Lift Mechanical Damage Pest Infestation Transit Damage Non Suitable Packaging Environmental	(Training pre requisite) (Ref pest control pre requisite) Goods in checks Material Spec. Sheet / Goods in Checklist Canopy /Goods in Checklist	No	No visual damage to delivered products.	X101 X132 X085 X038 EX038	Each Delivery of blend kits	Product rejected and returned to supplier. Quality dept informed. Responsibility – Production/Quality
3 Bags and Sacks to Automatic Opener	Fork Lift Mechanical Damage	(Training pre requisite)	No	No visible damage to product	X038/6 X101/4 X085/2 X038/6	Each blend	Inform manager. Inform Quality Ops Responsibility - Production
4 Bags Cut, Tea drops into System over magnets	Paper Foil Foreign Bodies in Tea	Preventative Measures on Cutting Blade Procedure for Jammed Bags Procedure for broken blade (Ref Glass pre-requisite) Documented Magnet Check Feedback via commodities to supplier on period basis	No	No large amounts of foreign bodies in tea. No foreign bodies added to tea	X216 X207 X249	Each blend	Product placed on hold – reject or release as appropriate. Change magnets and rechallenge. Responsibility – Production/Quality Ops
5 Tea Blended in Vessels	Physical Hazards Introduced (Jewellery, Pens, Nails) by Operator when clearing residual tea before and after organic product run.	Visual (Ref Personal housekeeping pre requisite) (Ref Glass pre-requisite)	No	No foreign bodies added to tea.	X127	Each blend Every 20 working days (min)	Inform manager. Place product on hold and isolate FB or reject blend. Inform Quality Ops Responsibility - Production

APPENDIX 4 – Generic Example of a HACCP plan for a Tea Blending Operation (For illustrative purposes only)

PROCESS STEP	HAZARD	PREVENTATIVE MEASURES	CCP No.	CRITICAL LIMITS	MONITORING		CORRECTIVE ACTION & RESPONSIBILITY
					PROCEDURE	FREQUENCY	
6 Tea dropped over vibratory sieves Sieves and Finds monitored.	Foreign bodies in tea Airborne Pests Personnel Poor hygiene	Vibratory sieves – Finds discarded down chutes (Ref pest control pre requisite) Side covers CCP monitoring Documented sieve check (Ref Personal housekeeping pre requisite) (Ref Glass pre-requisite) (Ref hygiene pre-requisite)	Yes CCP3	Sieves – all optimum size foreign bodies removed. Blender sieves 1,2 & 3 7.14mm and 2.78mm. Blender sieve 4 7mm and 2.75 mm	X240 X132 X127 X120	Documented sieve check daily. Daily cleaning. CCP monitoring daily.	Inform manager and QO if no finds or more than 30 finds are recorded in either bin for all shifts on two consecutive days. Check sieves for blockage or damage. Stop blending. Isolate tea and reject as appropriate. Inform Quality Ops Responsibility – Production
7 Tea discharged from blending system into tote bins passing over magnets and sampled.	Foreign Bodies in tea Foreign Bodies in/falling in empty bins Personnel Poor Hygiene Airborne Pests	Magnets and Visual Visual Open and close valve before filling (Ref Glass pre-requisite) (Ref Personal housekeeping pre requisite) (Ref hygiene pre-requisite) (Ref pest control pre requisite)	Yes CCP4	Magnets – no ferrous material of any size. Visual – no foreign bodies. Empty bins – clean i.e. no foreign bodies	X240 X207 X127 X120 X132 X216	Magnets checked as per procedure. Visual – before filling – each empty bin. Visual – whilst filling- each bin. Vibrator after each leaf blend.	Inform manager. Stop blending Isolate tea and reject as appropriate. Check magnets for blockage or damage. Replace magnets and rechallenge. Inform Quality Ops Responsibility – Production
8 Bin weighed, identified and Stored in WIP	Foreign Bodies Falling In Airborne Bodies (Flying Pests)	(Ref hygiene pre-requisite) Visual Colour coded bin covers (Ref pest control pre requisite) (Ref Glass pre-requisite)	No	No foreign bodies in bin	X216 X132	Each Bin.	Inform manager. Place product on hold. Isolate foreign body/bodies or reject. Inform Quality Ops. Responsibility - Production