



Qualifications

General Certificate in Packaging Beer

Examination Syllabus

Introduction

In advance of their examination, candidates will be expected to have full knowledge of the syllabus as examination questions can be asked from any of the topics as detailed below and in the learning materials. The examination may also include some calculation questions.

1: Introduction to Packaging

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Introduction to the packaging of beer	<ul style="list-style-type: none">• The purpose and functions of packaging• Classification of different levels of packaging (primary, secondary and tertiary)• Examples of typical beer packaging containers• An overview of the beer packaging process

2: Packaging Materials

Primary Packaging Materials – Glass Bottle

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Primary packaging	<ul style="list-style-type: none">• Small pack primary packaging examples:<ul style="list-style-type: none">• glass bottle (RB and NRB)• closure• label <p>For the above examples the following will be covered:</p> <ul style="list-style-type: none">• The usual materials of construction• The basic steps of manufacturing (glass bottle only)• The key design elements• Advantages and disadvantages of specific packages

Primary Packaging Materials – Plastic Bottle

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Primary packaging	<ul style="list-style-type: none"> • Small pack primary packaging examples: <ul style="list-style-type: none"> • plastic bottle • closure • label <p>For the above examples the following will be covered:</p> <ul style="list-style-type: none"> • The usual materials of construction • The basic steps of manufacturing (plastic bottle only) • The key design elements • Advantages and disadvantages of specific packages

Primary Packaging Materials – Can

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Primary packaging	<ul style="list-style-type: none"> • Small pack primary packaging examples: <ul style="list-style-type: none"> • can and can end • decoration <p>For the above examples the following will be covered:</p> <ul style="list-style-type: none"> • The usual materials of construction • The basic steps of manufacturing (can and can end) • The key design elements • Advantages and disadvantages of specific packages

Primary Packaging Materials – Large Pack

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Primary packaging	<ul style="list-style-type: none"> • Large pack primary packaging examples: <ul style="list-style-type: none"> • keg • cask • label <p>For the above examples the following will be covered:</p> <ul style="list-style-type: none"> • The usual materials of construction • The basic steps of manufacturing • The key design elements

	<ul style="list-style-type: none">• Advantages and disadvantages of specific packages
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Secondary and Tertiary Packaging Materials

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Secondary packaging	<ul style="list-style-type: none"> • The purpose and functions of secondary packaging • Secondary packaging examples including: <ul style="list-style-type: none"> • paperboard multipacks • corrugated boxes • crates • shrink wrap multipacks • ring carrier <p>For the above examples the following will be covered:</p> <ul style="list-style-type: none"> • The usual materials of construction • The key design elements • Advantages and disadvantages
Tertiary packaging	<ul style="list-style-type: none"> • The purpose and functions of tertiary packaging • Tertiary package examples: <ul style="list-style-type: none"> • pallet • plastic locator board • plastic film <p>For the above examples the following will be covered:</p> <ul style="list-style-type: none"> • The usual materials of construction • The key design elements • Advantages and disadvantages

3: Packaging Line Operation - Pre-Filler

Pre-filling Packaging Operations

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ul style="list-style-type: none">• Typical layout of a packaging line before the filler
Process	<ul style="list-style-type: none">• The purpose of each key operational step pre-filler, including the depalletiser, conveyor systems, washing systems (e.g. crate, returnable bottle, external keg and cask) and empty container inspection• Key principles of operation for those steps listed above
Technology	<ul style="list-style-type: none">• Small and large pack depalletising systems• Conveyor systems• Returnable bottle and crate washing systems• Large pack external cleaning systems• Empty container inspection

4: Packaging Line Operation – Beer Transfer, Filling and Stability

Supply and Handling of Beer

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ul style="list-style-type: none">• The requirement for continuous supply of beer to the filler• The principles of beer quality assurance• The key quality parameters that are controlled during beer transfer to packaging
Process	<ul style="list-style-type: none">• The key stages of beer transfer, storage and supply assurance• Typical procedures for maintaining beer quality before the filler.
Technology	<ul style="list-style-type: none">• Beer transfer and storage systems

Filling and Closing – Small Pack

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ul style="list-style-type: none">• The principles of filling and closing containers
Process	<ul style="list-style-type: none">• Key stages of filling and closing operation• Fill level control• Full container inspection• Preventative measures to avoid oxygen during filling and closing
Technology	<ul style="list-style-type: none">• Small pack filling and closing systems

Filling and Closing – Large Pack

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ul style="list-style-type: none">• The principles of filling and closing containers
Process	<ul style="list-style-type: none">• Key stages of filling and closing operation• Fill level control• Full container inspection• Preventative measures to avoid oxygen during filling and closing
Technology	<ul style="list-style-type: none">• Large pack filling and closing systems

Beer Pasteurisation, Sterile Filtration and Aseptic Filling

Topic	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ul style="list-style-type: none">• The key principles of pasteurisation• The definition of a pasteurisation unit (PU)• The key principles of sterile filtration• The key principles of aseptic filling and closing
Process	<ul style="list-style-type: none">• Typical stages of a tunnel and flash pasteuriser operation• Monitoring and control of pasteurisation effectiveness• Typical operation of a sterile filter• Typical operation of an aseptic filler• Monitoring and control of sterile filtration and aseptic filling effectiveness
Technology	<ul style="list-style-type: none">• Tunnel and flash pasteurisation systems• Sterile filter systems• Aseptic filling and closing systems

5: Packaging Line Operation – Labelling and Final Package Consolidation

Labelling and Coding (Small and Large Pack)

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ul style="list-style-type: none">• The purpose of labelling and coding• Legal requirements for information on a package• The importance of record keeping and traceability
Process	<ul style="list-style-type: none">• The key principles for effective label application and coding• Typical requirements associated with the use of adhesives• Advantages and disadvantages of automatic and manual labelling
Technology	<ul style="list-style-type: none">• Small pack and large pack labelling systems• Coding systems in packaging• The key requirements of wet glue for effective labelling

Package Consolidation and Palletising (Small and Large Pack)

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ul style="list-style-type: none">• Typical layout of a packaging line after labelling / coding
Process	<ul style="list-style-type: none">• The purpose of each key operational step after labelling / coding, e.g. small pack consolidation and palletisation• Key principles of operation for those steps listed above• Key quality checks during steps listed above
Technology	<ul style="list-style-type: none">• Small pack consolidation• Palletising systems

6: Quality

Process Control

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Process and product consistency	<ul style="list-style-type: none">• The definitions of variation and variability• The purpose of a specification• The concept of tolerance for specification ranges• Simple statistical quality control procedures• Simple methods for recording, reporting and the interpretation of data• The principles of monitoring and adjustment to achieve product consistency• Typical applications for in-line and on-line instrumental process control

Quality Management

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Features of a quality system	<ul style="list-style-type: none">• The definition and benefits of a quality management system• The processes to implement a quality management system• Examples of quality management systems and their key principles
Product safety	<ul style="list-style-type: none">• The typical steps in implementing a HACCP system• The key elements of good manufacturing practices (GMPs) and good laboratory practices (GLPs)

Dissolved Oxygen and Beer Flavour

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
The spoilage of beer by oxygen	<ul style="list-style-type: none">• The impact of oxidation on beer quality• Typical flavour compounds from oxidation• Key control points in the process where beer risks exposure to oxygen• Key control points for measuring dissolved oxygen• Total in package oxygen (TPO) assessment
Flavour control and sensory assessment	<ul style="list-style-type: none">• The importance of flavour control in packaging• The role of the sensory assessor• Common faults / contamination that may be detected by tasting during packaging operations

7: Hygiene

Contamination and Control

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Non-microbiological contamination	<ul style="list-style-type: none">• The definition and sources of non-microbiological contamination• Methods for detecting non-microbiological contaminants
Microbiological contamination	<ul style="list-style-type: none">• The definition and sources of microbiological contamination• Methods for detecting microbiological contaminants
Monitoring and control of contamination	<ul style="list-style-type: none">• The principle ways to achieve microbiological and non-microbiological control in a packaging plant• The types of chemical, light and heat sanitisers commonly used

Plant Cleaning

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
CIP systems	<ul style="list-style-type: none">• The four key factors for efficient packaging plant cleaning• The different types of detergents used and the reasons for their choice• The types of cleaning heads used and reasons for their choice• Differences between single use and recovery systems• The operating principles of CIP systems
CIP cleaning cycles	<ul style="list-style-type: none">• Typical cleaning programmes and cycle times• The function of each of the cleaning cycle stages• Requirements for the cleaning specific packaging equipment including the pasteuriser
CIP plant design	<ul style="list-style-type: none">• The design features that minimise dirt accumulation in vessels and pipelines and encourage efficient cleaning• The design features which promote a hygienic working environment

8: Engineering, Environment and Safety

Engineering and Maintenance

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Approaches and tasks	<ul style="list-style-type: none">• The key business reasons for an effective maintenance system• The features, advantages, disadvantages and applications of maintenance systems• Key maintenance tasks• The contribution of maintenance tasks to packaging plant safety, reliability, quality, economics and environmental impact
Performance improvement	<ul style="list-style-type: none">• The key features of the following performance improvement systems:<ul style="list-style-type: none">○ Reliability Centred Maintenance (RCM)○ Total Productive Maintenance (TPM)○ Workplace Organisation (6S)

Packaging Line Capacity and Performance

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Efficiency reporting	<ul style="list-style-type: none">• The principles of packaging line efficiency, planning, measurement and reporting• Typical calculations used for monitoring packaging line efficiency• Visual management (VM)
The “V-curve”	<ul style="list-style-type: none">• Line capacity rating conventions and the basic principles of a “V-curve”• Efficiency limiting factors and critical processes• Machine cycle times and maintaining a packaging line in balance
Beer and packaging material losses	<ul style="list-style-type: none">• The analysis of data and basic calculations of losses• The causes and control of beer and material losses

Environment and Utilities

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Sustainability and climate change	<ul style="list-style-type: none"> • The guiding principles of sustainability, and the concepts of a sustainable industry • Reduction of packaging waste • The impact of packaging waste on household (consumer) recycling • The role of carbon dioxide and the carbon cycle • The principal sources of carbon dioxide emissions
Process gases	<ul style="list-style-type: none"> • The role of carbon dioxide, air and nitrogen as process gases
Steam and energy	<ul style="list-style-type: none"> • The main uses of steam in packaging • The principal energy consuming activities in packaging • Heat recovery systems
Water	<ul style="list-style-type: none"> • Categories of water: product water, process water and service water • Prevention of <i>Legionella</i> infection in water systems

Effluent

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Sources of effluent and measurement	<ul style="list-style-type: none"> • The components of effluent quality: <ul style="list-style-type: none"> ○ volume ○ suspended solids ○ chemical and biological oxygen demand ○ pH and temperature • Measurements of effluent quality • Control methods used for reducing effluent
Effluent treatment technologies	<ul style="list-style-type: none"> • Aerobic and anaerobic systems and their relevant application • Temperature, flow and pH considerations for consented discharge to sewer

Health and Safety

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Health and safety	<ul style="list-style-type: none">• The essential precautions needed in the beer packaging plant to make it a safe working environment• Typical hazards in the packaging environment• Typical risks associated with manual handling and working with machinery• The principles of safe forklift truck operations
Chemical safety	<ul style="list-style-type: none">• The hazards associated with chemical cleaning and sanitising agents• Good practices for the storage of chemicals• Use of personal protective clothing• Procedures in case of accidental spillage or discharge of chemicals