



Qualifications

General Certificate in Malting

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 Malting

1.1 Introduction to malting

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Introduction to malting	<ul style="list-style-type: none">• Definition of malt and malting• The reasons for malting cereals• The key stages of the malting process• The required outcome from each stage

2 Cereals

2.1 Cereals used for food and drink

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Cereals and food	<ul style="list-style-type: none">• The global cultivation of cereals for food history and importance to man• The factors effecting price and supply
Types of Cereal	<ul style="list-style-type: none">• The types of cereals grown globally for use in food, brewing and distilling• Alternative cereals to barley for malting for brewing and distilling
Malted Cereal	<ul style="list-style-type: none">• Uses of malted cereals (including non-brewing/distilling uses) and malt co-products• The properties of malted cereals used in brewing and distilling

2.2 Barley

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Barley growing	<ul style="list-style-type: none"> • The global barley growing regions • The physiology of a barley grain • The barley growth cycle • The process of harvesting barley
Barley varieties	<ul style="list-style-type: none"> • Morphological characteristics of barley Differences between two- and six-row barleys • Winter and spring barley varieties and their uses • The development and establishment of new barley varieties • The key biochemical attributes of barley for malting, brewing and distilling
Barley breeding	<ul style="list-style-type: none"> • Barley breeding techniques • The development and approval process for new varieties in key global barley growing regions
Barley purchasing	<ul style="list-style-type: none"> • Contracting and purchasing of barley • Feed vs malting barley

2.3 Barley intake and storage

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"> • Barley intake sampling and evaluation • Laboratory and rapid methods of determining barley quality • Hand evaluation and inspection
Process	<ul style="list-style-type: none"> • Barley screening operations • Methods of drying barley • Storage requirements for barley • Barley storage housekeeping and pest control • Use and control of pesticides
Technology	<ul style="list-style-type: none"> • Key elements of barley intake equipment • Design of dust extraction plant • Co-products handling equipment

3 The Malting Process

3.1 Steeping

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">• Objectives of steeping• Predictive tests for germination and their interpretation• Selection of barley for specific malts• Significant changes in barley during steeping
Process	<ul style="list-style-type: none">• Operating principles of steeping plant• Importance of barley washing• Importance of aeration and CO₂ extraction• Process control parameters in steeping• Factors affecting moisture uptake• Steep programme design
Technology	<ul style="list-style-type: none">• Key design features of common barley washing and steeping plant• Advantages/disadvantages of different steeping plants

3.2 Germination

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">• Objectives of germination• Significant changes in barley during germination• The role of enzymes• Controlling the degree of modification• Hand evaluation of modification• Laboratory analyses of germination
Process	<ul style="list-style-type: none">• Operating principles of germination plant• Germination temperature control• Importance of air flow and air conditioning• Process control parameters• Germination programme design• Use of additives in germination• Germination plant hygiene considerations
Technology	<ul style="list-style-type: none">• Different types of germination plant• Advantages/disadvantages of different germination plants

3.3 Kilning

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"> Objectives of kilning malt Significant changes in barley during kilning Development of malt colour and flavour during kilning
Process	<ul style="list-style-type: none"> Operating principles of kilning, including the phases of the cycle Planning kilning cycles for specific malts Impact of air flow, humidity and temperature control The 'break point' Process control parameters Kilning programme design Measurement and control of finished malt specification – enzyme activity, NDMA, DMSp Control of moisture levels, and effect on finished malt quality Control of cooling off-kiln
Technology	<ul style="list-style-type: none"> The different types of kilning plant Advantages/disadvantages of different kilning plants

3.4 Malt storage and dispatch

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"> Objectives of storage and dispatch of malt Storage requirements of malt
Process	<ul style="list-style-type: none"> Operating principles of deculming and screening plant Dispatch quality checks
Technology	<ul style="list-style-type: none"> Mechanical handling – conveyor and elevator types Different types of malt stores Different types of out-loading systems
Malt specifications	<ul style="list-style-type: none"> Sampling of finished malt Finished malt specifications for brewing and distilling malts Implications of blending of malt to achieve specification

3.5 Speciality malt production

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 characteristics of the different types of speciality malts • Raw materials for speciality malt production
Process	<ul style="list-style-type: none"> • The process of manufacture for various speciality malt types • The operation of malt roasting equipment • Process control parameters
Technology	<ul style="list-style-type: none"> • The design principles of malt roasting equipment

4 The Use of Malt in Brewing and Distilling

4.1 Beer and brewing

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Definition of beer and types of beer	<ul style="list-style-type: none"> • A definition of beer • Types of beer and the origin of beer styles
Barley and malt	<ul style="list-style-type: none"> • The brewer's key malt parameters: degree of modification, extract content, moisture content and colour • Pre-acceptance checks at malt intake • The activities of malt intake and processing in the brewery • Typical uses of speciality malts
Malt's impact on beer	<ul style="list-style-type: none"> • The role of malt enzymes in mashing • Malt modification and wort and beer filterability • Malt's importance as source of: <ul style="list-style-type: none"> ○ fermentable material ○ proteins for foam stabilisation ○ yeast nutrients ○ beer colloidal and flavour stability

4.2 Distilling

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Definition and styles of potable spirits	<ul style="list-style-type: none">• Definitions of the main spirits derived from malt• The range of spirit types and their respective styles and characteristics
Mash and its uses, including green malt and peated malt	<ul style="list-style-type: none">• The selection of malt for spirit type and mash conversion method• The distiller's key malt parameters: extract content, moisture content, PSY, ATNC, EC• Pre-acceptance checks at malt intake• The activities of malt intake and processing in the distillery• The important attributes of malt for mashing and fermentation

5 Quality

5.1 Process control

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Process control	<ul style="list-style-type: none">• 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

5.2 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 implementation steps of a quality management system• Examples of quality management systems and their key principles
Product safety	<ul style="list-style-type: none">• The typical steps of implementing a HACCP system
Malt related food safety	<ul style="list-style-type: none">• Food safety hazards from outside the malting plant• Food safety hazards from within the malting plant

6 Hygiene

6.1 Plant cleaning

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Cleaning systems	<ul style="list-style-type: none">• Automatic vs manual cleaning• Four key factors for efficient plant cleaning• The key elements for successful cleaning• Equipment design for effective cleaning
Pest control	<ul style="list-style-type: none">• General site pest control principles• Common malting pests• Insect detection and control
General plant cleaning	<ul style="list-style-type: none">• Cleaning plant surfaces, walls and floors• The constituents of foam cleaning agents• The use of foaming systems, chlorinated and high-pressure water cleaning

7 Engineering, Environment and Safety

7.1 Engineering and maintenance

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
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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 various maintenance systems • The contribution of maintenance tasks to plant safety, reliability, quality, economics and environmental impact • Familiarity with key maintenance tasks
Systems for continuous 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 (5S)

7.2 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 concept of a sustainable industry • The role of carbon dioxide – the carbon cycle • Sources of carbon dioxide emissions
Conservation	<ul style="list-style-type: none"> • Principal energy consuming activities in a malthouse • Typical energy reduction strategies • Principal water consuming activities • Typical water conservation strategies
Energy	<ul style="list-style-type: none"> • Energy cost control • Heat recovery in the maltings • Combined Heating and Power (CHP) systems
Water	<ul style="list-style-type: none"> • Characteristics and quality of an ideal malt plant water supply • Sources of water for a malt house • Differentiation and typical uses of water in malt production • Control of Legionella infection in water systems

7.3 Effluent

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Sources of effluent and its measurement	<ul style="list-style-type: none"> • The components of effluent quality: volume suspended solids chemical and biological oxygen demand, pH and temperature • Measurement of effluent quality

	<ul style="list-style-type: none"> 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

7.4 Health and safety

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Malting plant safety considerations	<ul style="list-style-type: none"> The fundamental principles of health and safety and the hierarchy of controls. The hazards associated with gases in the malt plant Precautions against atmospheres containing high levels of hazardous gas Safe working practices for malting plant operations Best practices for ensuring safety around vehicles. The control of hazards associated with confined spaces in the malt plant.
Malt and barley storage plant safety considerations	<ul style="list-style-type: none"> The hazards associated with dust Explosive atmospheres in the workplace Safe working practices for malt storage plant operations
Chemical safety	<ul style="list-style-type: none"> The hazards associated with chemical cleaning and sterilising agents Good practices for the storage of chemicals Use of personal protective equipment (PPE) Procedures in case of accidental spillage or discharge of chemicals