



**GUIDANCE NOTES AND SYLLABUS
FOR THE MALTING DIPLOMA
EXAMINATION 2017**

The Maltsters' Association of Great Britain

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GUIDANCE NOTES

General Information

Subject to there being sufficient candidates, the MAGB Malting Diploma Examination will be held during the week beginning 19th June 2017 in the UK. For overseas entrants, arrangements may be made to hold the examination at an approved centre in or near the candidate's country of origin, but this cannot be assumed to be the case. The examiners reserve the right to decide which location will be used.

Examiners also reserve the right to cap the number of examination candidates to a maximum of 20 people.

This International Examination, which will be in English, will be open to both home and overseas candidates. No formal qualifications will be required for entry to the exam. The Syllabus is wide ranging and designed to cover all aspects of malting.

Sponsorship

Each candidate must be sponsored by a person normally within his/her own company, who will be approved by the MAGB. The name of the sponsor must be declared at the time of registration. The sponsor will act as the candidate's adviser and assist them with their preparation for the examination.

Sponsors will be assisted in their task by receiving a "Guide to Sponsors", once the candidate has been accepted by the MAGB, or by prior application of the Sponsor to the MAGB.

Sponsors will be expected to ensure that candidates have the opportunity to receive instruction in all aspects of practical and theoretical malting and are properly advised on how to prepare for the examination. It is anticipated that some of this learning and training will take place during normal working hours as agreed by the MAGB Executive.

Experience Prior to Entry

Candidates preparing themselves for this examination must acquire a basic theoretical and practical knowledge of all aspects of malting. They will be expected to demonstrate understanding and practical experience of the malting process and related operations; they will also be expected to possess a basic understanding of the commercial, scientific and engineering aspects of malting.

The candidate's relevant work experience and responsibilities must be listed and certified by their sponsor in the candidate's log at the time of registration (copy attached with Registration Form). It is recommended that this experience should include a minimum time in the following departments:-

Barley purchasing	1 month
Barley intake	2 months
Barley handling and management	3 months
Malt processing	6 months
Malt handling and despatch	2 months
Quality control and laboratory	3 months
Engineering services	3 months

The minimum times stated are for your guidance but it is important that candidates gain experience in others areas of their respective businesses as this will be advantageous in

structuring answers during the examination. In addition, some experience should be gained at a brewery and distillery. If you are a Brewer or Distiller Maltster you must be familiar with the techniques, practices, quality requirements and analytical methods of the Sales Maltster and vice-versa.

It is the Examiners' experience that candidates who fail generally do so because of a lack of breadth and depth of experience across the whole field of technical malting.

Gaps in experience should be filled by the time the updated candidate's log is submitted in April 2017.

Revision and Training for the Exam

Sponsors should assess and deliver training in areas where the candidates experience is limited. The candidate and the sponsor must ensure the candidate is aware of the major factors affecting the UK malting industry.

Candidates are recommended to consult the standard text books which deal with the malting and related processes and to keep in touch with the more practical papers, which appear in the various journals. A suggested reading list is appended to these notes. Candidates are also advised to become members of the Institute of Brewing and Distilling which will give them access to a bank of useful on-line articles and subscription to the Brewer and Distiller magazine.

Whilst the examination is designed to test the candidate's practical knowledge of malting, it is emphasised that the candidate should demonstrate through the exam the capacity to construct a reasoned, logical and literate written answer. This may demand particular effort and training for those candidates with limited experience of written examinations.

Candidates are advised to refresh their exam technique by providing written answers to questions for proof reading by their sponsors prior to the examination or by requesting mock exam papers from MAGB which will then be marked by an MD Examiner and results relayed to the candidate. There will be a charge for providing this service. Read the question, consult reference literature and roughly outline an answer. Then sit down and write and complete the answer within the permitted time span on the paper. It is often noticed that candidates are not fully prepared to write extensively over a three hour period in the exam, which is reflected in the quality of their presentation.

Past examination questions will be available on the MAGB website. It is strongly recommended that candidates use these as practice questions.

Do take up invitations to learn about other malting plants and methods other than your own. If you cannot make your own arrangements for exchange visits, contact the MAGB office who will offer assistance.

The Examination

The standard of the examination will be high, and will be confined to practical and theoretical aspects of malting including a comprehensive knowledge of the uses of malt.

The examination will consist of three written papers, each of 3 hours duration: Module 1 – Raw Materials; Module 2 – Processing; Module 3 – Health, Safety, Environment, Quality and Food Safety. For each paper there will be one compulsory question and a number of other questions to be chosen by the candidate from the options on the paper. The modules can be taken either separately or all together. Candidates who fail any of the three modules can choose to retake them another year up to a maximum of two retakes per module. The Diploma will not be awarded until all three modules have been passed. Candidates must indicate on their registration forms how many modules they intend to take in 2017. There will be a charge of £200 per module for retakes of failed modules but no extra charge for taking the modules separately.

The three written papers will account for a third each of the total marks. Candidates must achieve a pass mark in each module of the examination to be successful. The Pass mark that must be achieved for each module is 50%. All written work from overseas candidates will be sent to the UK for assessment.

Examination Technique

Examiners have found that many answers to previous papers have been poorly constructed and presented in muddled sentences. Answers should be roughly mapped out beforehand so as to cover all aspects of the question. Marks will be deducted for poor standards of writing and presentation.

Answers should be concise and not lengthened with non-relevant information. Cover as much varied detail as possible and do not write endless paragraphs about one small facet of the topic. Candidates must read the questions carefully otherwise answers may miss the main points or become too lengthy resulting in insufficient time to properly answer other questions and losing marks overall.

Where a question is not directly associated with malting, try to relate your answer to show its significance to the industry.

Try to preface answers with a short introduction and make the final paragraph a concise summary.

Too often candidates include information that is superficial and inaccurate.

Examiners are not looking for fine detail of a category that only a specialist would be expected to understand and padding out answers with such detail will not gain marks. Answers should reveal facts that are relevant to the practical solution or understanding of a problem and their significance to the industry should be explained.

A sample question and notes about what should be covered in the answer can be found at the end of the Syllabus.

The Award

The Maltsters' Association of Great Britain will award a certificate to successful candidates. This qualification will be 'The Malting Diploma' awarded by the MAGB, and holders are entitled to use the designation Dipl.Malt. In addition, those candidates achieving a sufficiently high mark in all sections of the examination will be awarded a Pass with Distinction. There may also be a single special award, 'The Walter Hyde Award for

Distinction', given at the discretion of the examiners, where there is a candidate who has passed the examination with appropriate distinction.

Queries about Results

Drawing up the list of results is the responsibility of the Examination Board (EB) on behalf of The Maltsters Association of Great Britain (MAGB). The EB exercises judgement as to whether or not each candidate has reached the standard required to qualify for the award of a Malting Diploma and this decision is final in that there is no right of appeal to any other body outside MAGB. At each stage of the award process, careful checks are made to ensure that the EB makes decisions on the basis of full and accurate information.

If a candidate thinks that an error has been made in a result they can query it with the Executive Director of the MAGB. Before doing this, the candidate should discuss the result with their sponsor. If the candidate still wishes to pursue the query they should write a brief letter to the MAGB Executive Director within three weeks of the date of notification of the result in question.

It is not possible to arrange for scripts to be re-marked, for information about examination performance to be provided (other than that information contained in the letter notifying the candidate of the result), or for previously undisclosed special circumstances to be considered. All queries will be thoroughly investigated, and if any error comes to light, the matter will be referred to the EB. A reply will be sent to the candidate as soon as possible.

Formal Appeals

Should a candidate fail, and after making a query (as above) still be dissatisfied with the MAGB decision, appeal may be made to the Chairman of the Technical Committee through the MAGB Executive Director. Any such detailed applications must be made within three weeks of the date of reply to the original query.

Appeal can only be made against a 'fail' result. The powers of the Chairman of the Technical Committee extend only to establishing that results have been determined in the proper manner, not to changing the decision of the EB, since the EB has been empowered to take such decisions by the MAGB.

Timetable

The final date for registration for the examination is Friday 16th December 2016. The Registration Form is on the MAGB website for on-line completion and requires input from your sponsor.

An updated candidate's log must be submitted to the MAGB by your sponsor no later than Friday 28th April 2017. Note that you may be excluded from the written examination if this is not received.

Latest date for returning Registration Form and the Candidate's Log.	Friday 16 th December 2016
Return by Sponsor of updated Candidate's Log	Friday 28 th April 2017
Written examinations take place	During the week beginning Monday 19 th June 2017

Fees

The registration fee per module of the examination for employees of MAGB members will be £200 plus VAT per candidate. The cost for resitting a failed module will be £200 + VAT. For all other candidates, the registration fee will be £400 per module. The cost for resitting a failed module will be £400 + VAT. Your company will be invoiced once your registration has been accepted.

SYLLABUS

Module 1 - Raw Materials

Barley:

- Malting barley varieties
- IBD approved list
- Breeding and growing malting barley
- Barley identification, the use of morphological characteristics and electrophoresis
- Null Lox
- Diseases and seasonal factors
- Pre-germination
- Basic knowledge of other cereals
- Basic knowledge of farming practices

Barley purchasing and handling:

- Barley Contracts
- Acceptance/rejection of deliveries
- Intake and sampling procedures
- Due diligence monitoring
- Farm assurance schemes, grain passports, approved use of post-harvest pesticides
- Drying, screening and storage of grain
- Types of stores
- Conveying and handling equipment
- Infestation precautions and treatments
- Temperature control and monitoring of stored grain
- Maintaining quality prior to malting

Principles and interpretation of barley analyses:

- Controls for reducing the impact of dormancy
- Germinative energy and water sensitivity tests
- Water uptake assessments
- Micromalting tests

Barley supply and demand:

- Political factors (eg CAP, WTO) affecting world trade in barley
- World grain market drivers – eg biofuels, weather, commodities and geopolitics

Module 2 – Processing

Steeping:

- Water quality and typical volumes used for processing
- Effects of differing water temperatures
- Use and design of aeration equipment and design used in steeping
- Importance and function of air rest periods
- CO₂ extraction, equipment design and typical air volumes used in various designs of steeping vessels
- Achieving appropriate levels of moisture during the steeping process and at cast
- Design of steeping equipment
- Barley washers
- Use of automated recipe based process controls

Additives and processing aids:

- Reasons for the use and application of GA

Germination techniques:

- Different types of vessel design
- Control of moisture in germination
- Control of air temperature and the volumes of air used to maintain control
- Batch size
- Humidity control equipment
- Visual evaluation of germinating grain
- Use of automated recipe-based process controls
- Endosperm modification, enzymes, cell wall modification and proteolysis

Psychrometric charts:

- Interpretation and use in designing malting plant

Kilning procedures:

- Variations for different malt qualities
- Fuels and heating equipment used for kilning
- Kiln design
- Methods in use for reducing energy consumption
- Control of malt analysis
- Malting loss management by variation in processing techniques
- Coloured/roasted and special malts including peating
- Control of flavour compounds in kilning
- Use of automated recipe-based process controls
- Control of NDMA

Types of malting plant:

- Machinery and conveyors
- Air conditioning systems

Malt Despatch:

- Deculming
- Screening
- Weighing
- Sampling
- Grading
- Storage and stock control

- Despatch in bags and bulk
- Conveying equipment to minimise malt breakage
- Malting loss, its source and control

Recommended methods of malt analyses:

- IOB, EBC, ASBC Methodologies
- Specification
- Interpretation
- Quality assurance and quality control
- Use of statistical techniques

Co-products :

- Production and handling
- Analysis

Services:

- Water,
- Electricity all aspects of supply and distribution
- Fuel types, costs pros and cons
- Effluent – types of treatment available, water reuse

Energy conservation:

- Maintenance – computerised maintenance management systems, costs, compliance checks
- Instrumentation automation, PLC controls
- Control systems, closed loop, open loop

Capital and operational costs

Project appraisal:

- Criteria for project approval, payback methods
- Types of project

Distribution

General understanding of the brewing and distilling processes:

- Reasons for specifications of certain malt properties
- Diastatic and non-diastatic malt extracts
- Glycosidic nitrile (GN)
- Predicted spirit yield (PSY)
- The influence of malt quality on brewhouse performance
- Mashing and separation techniques
- Wort quality
- Uses of malt and malt products within the food industry

International malting industry and its markets:

- Industry economics
- Producers and users
- Political factors (eg CAP, WTO) affecting world trade in malt

Module 3 – Health, Safety and Environment

Hazards and safety in malting:

- Health and safety issues
- Confined spaces
- Dust and explosion risk and DSEAR regulations
- Safe working procedures
- COSHH
- Work permits
- Risk assessments
- Handling and storing chemicals and additives

Accident reporting:

- RIDDOR

Standards and Legislation:

- ISO 9001, ISO 14001,, ISO 18001, ISO22000, ISO50001
- FEMAS
- UFAS
- TASCC
- GTAS
- AUKM
- Organic, Kosher and Halal Certification
- HACCP
- The Food Safety Act
- Feed Hygiene Regulations
- Food Hygiene Regulations
- DEFRA Code of Practice for the Control of Salmonella
- Health and Safety Legislation
- IPPC
- EU Food Safety Directives and Legislation
- PUWER
- CDM
- Control of Noise Regulations

Environment:

- Construction of a risk matrix for environment
- Organising mitigation measures
- Environmental impact of different parts of the process
- Waste management

Quality:

- Quality assurance schemes
- Reporting, monitoring and controlling quality
- Impact on business operations and on malt performance in the brewery or distillery
- Analytical parameters
- Typical values
- Action measures when outside pre-defined limits

Food Safety:

- HACCP
- Cleaning and plant hygiene
- Awareness of certification standards

- Legionella
- Pest control

Malting Engineering:

- Fan laws and their interpretation
- Principles of heat transfer – conduction, convection and radiation
- Fluid flow – definition of laminar and turbulent flow, calculations on volume flow, Bernoulli equation
- Valves – types and applications
- Electrical motors
- Pumps – types and applications
- Materials of Construction- Stainless steel types, mild steel use, corrosion, insulation

Energy Efficiency**Waste water:**

- Principles of treatment
- The Mogden formula

MAGB MALTING DIPLOMA EXAMINATION 2017
LOG OF CANDIDATE'S EXPERIENCE AND TRAINING

Department: **Barley Purchasing**
 Experience Recommended: **1 month**

Candidate's Comments	Sponsor's Comments
Time spent:	

Department: **Barley Intake**
 Experience Recommended: **2 months**

Candidate's Comments	Sponsor's Comments
Time spent:	

Department: **Barley Handling and Management**
 Experience Recommended: **3 months**

Candidate's Comments	Sponsor's Comments
Time spent:	

Department: **Malt Processing**
Experience Recommended: **6 months**

Candidate's Comments	Sponsor's Comments
Time spent:	

Department: **Malt Handling and Despatch**
Experience Recommended: **2 months**

Candidate's Comments	Sponsor's Comments
Time spent:	

Department: **Quality Control and Laboratory**
Experience Recommended: **3 months**

Candidate's Comments	Sponsor's Comments
Time spent:	

Department: **Engineering Services**
Experience Recommended: **3 months**

Candidate's Comments	Sponsor's Comments
Time spent:	

Experience gained at a Brewery

Candidate's Comments	Sponsor's Comments
Time spent:	

Experience gained at a Distillery

Candidate's Comments	Sponsor's Comments
Time spent:	

Candidate's Signature:

Sponsor's Signature: **Date:**

SUGGESTED READING LIST

This list is not intended to be exhaustive but will provide a good grounding in the main subject areas.

1. Malting and Brewing Science: D.E. Briggs, J.S. Hough, R. Stevens , T.W. Young - Volume 1- Malt and Sweet Wort: Malt and Sweet Wort (2nd edn. 1981)
2. Malting and Brewing Science: D.E. Briggs, J.S. Hough, R. Stevens , T.W. Young - Volume 2- Hopped Wort and Beer (2nd edn. 1982)
3. The Biotechnology of Malting and Brewing (Cambridge Studies in Biotechnology), J.S. Hough (1991)
4. Scientific principles of malting and brewing: C.W. Bamforth (2006) American Society of Brewing Chemists
5. Brewing – New Technologies: C.W. Bamforth (ed), 2006, Woodhead Publishing
6. Malts and Malting: D.E. Briggs (1998), Blackie Academic Publishing
7. HGCA – Introductory Guide to Malting Barley:
8. <http://www.ukmalt.com/sites/default/files/files/G05%20Introductory%20guide%20to%20malting%20barley.pdf>
9. MAGB HACCP Guide: <http://www.ukmalt.com/downloads/MAGBHACCPprotocol4.pdf>
10. Food Safety and Hygiene – see MAGB website: www.ukmalt.com
11. Brewing Science and Technology (Series 2, volume 4)-Engineering (including distillation). IOB publication
12. Cereal Science and Technology. Edited by G H Palmer. ISBN 0-08-035064-X, Aberdeen University Press.
13. Malting Technology. European Brewery Convention Manual of Good Practice. ISBN 3-418-00753-8
14. Pauls Malt Brewing Room Book 2001-2003. Available to MD candidates on request from the MAGB.

SAMPLE EXAM QUESTION AND NOTES ON WHAT SHOULD BE COVERED IN THE ANSWER

Question

Use diagrams to compare and contrast the features of a modern day conical steep against the alternative of a flat bottom steep. Include in the diagrams all relevant dimensions, capacities and a full description of all the connected services including flow rates relevant to each of the process facilities.

Notes

A general note should be made of the fact that often conical steeps are used in multiple numbers as opposed to the flat bottomed steep where usually only one would be used for each batch.

The diagram of a conical steep should include the following:

- Typical dimensions of depth and width and grain capacity of each unit
- Materials of construction
- Barley transfer method to fill the steep
- Dust suppression if relevant
- Level control mechanism for grain, weighed amount or ultra-sonic/proximity probe
- Water fill point including rate of fill, volume of stored water should be considered where multiple units have to be filled, water transfer rates in M³/h
- Provision for temperature control of water fill
- Any provision made for overflowing during the wet phases
- Expected total use of water for each batch dependant of number of wet cycles used
- Drain facilities and rate of discharge
- Aeration facilities and positioning, below plenum, fixed pipes, centre lift tube etc.
- CO₂ removal, fan type, air volumes (in the region of 100 to 150 M³/t/h), position of fan and air ducts and isolation valves where appropriate for low level installations -
- Positioning of other temperature monitoring equipment, water, air on and off
- Any provision made for air conditioning, temperature control and recirculation
- Access for cleaning behind the plenum area
- Fixed CIP equipment, spray balls, fixed peripheral nozzles
- Method of discharge into conveying equipment
- Provision for control and automation, staggered filling emptying and control to minimise turnaround times between batches
- H&S precautions, permit for safe access to confined spaces for maintenance or internal cleaning

The diagram of a flat bottom steep could refer to a conventional design or the more modern Eco-steep alternative but would consider the following points:

- Typical dimensions of depth and width and batch size
- Materials of construction
- Barley transfer method to fill the steep
- Dust suppression if relevant
- Level control mechanism for grain, weighed amount or ultra-sonic/proximity probe
- Water fill point including rate of fill in M³/h

- Any provision made for overflowing during the wet phases
- Provision for temperature control of water fill
- Expected total use of water for each batch dependant of number of wet cycles used with specific mention made where there is a significant volume of water required to fill the area beneath the plenum (often 500mm) in a conventional flat bottomed steep
- Drain facilities and rate of discharge
- Aeration facilities, single or multiple units, positioning, below plenum or multiple array of fixed pipes in the case of an Eco-steep
- CO₂ removal, fan type, number of units, air volumes (in the region of 250 to 500 M³/t/h), position of fans and air ducts and isolation valves where appropriate for low level installations
- Positioning of other temperature monitoring equipment, water, air on and off
- Any provision made for air conditioning, humidification, temperature control and the recirculation of air
- Access for cleaning below the plenum area in more conventional designs by the ability to lift sections of floor plates
- Any fixed CIP equipment, spray balls, fixed nozzles on internal mechanical transfer equipment
- Method of discharge onto conveying equipment, centre or side discharge options
- Provision for control and automation
- H&S precautions, permit for safe access to confined spaces for maintenance or internal cleaning

A contrast should be drawn against the conical and flat bottomed steeps highlighting the capability of a flat bottomed steep to control grain temperatures due to the higher airflows achievable particularly prior to casting but also where extended air break periods are required between water immersions.

Another general point that should be considered is the amount of space that is required to install a flat bottomed steep against a similar batch size that could be achieved using a group of conical steeps.

Provision for effluent buffering capacity should also be considered as conical steeps' discharges are usually staggered but the use of flat bottomed steeps with large batch sizes have to be handled within a relatively short period of time (1 hour typically) The availability of stored water relative to replenishment volumes available should also be considered to ensure that the demands that flat bottomed steeping would impose can be met.

Consideration should be given to noise emissions from ventilation and extraction equipment that could have an adverse impact on employees working in those areas and also neighbouring properties.

Expanding the scope of your answer to the question to cover elements of good management practice, health and safety, environmental compliance for example will help to demonstrate a broader understanding of the subject matter and will receive credit during the marking process.