



## Higher National Unit specification

### General information for centres

**Unit title:** Food Manufacturing: Processing Practices at Sub-Ambient Temperatures

**Unit code:** F6VJ 34

**Unit purpose:** This Unit is designed to enable candidates to gain practical experience of processing operations carried out at sub-ambient temperatures within the food industry. The Unit will enable them to determine appropriate processing techniques to ensure that food safety and food quality requirements are met.

On completion of the Unit the candidate should be able to:

- 1 Conduct commercial chilling of foods.
- 2 Conduct commercial freezing and thawing techniques.

**Credit points and level:** 1 HN credit at SCQF level 7: (8 SCQF credit points at SCQF level 7\*)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

**Recommended prior knowledge and skills:** Candidates should have some knowledge and understanding of the food industry and the processing methods it uses. This could be demonstrated by successful completion of the following Units:

- ◆ F6VF 34 *Food Industry Principles: An Introduction*
- ◆ F6VE 34 *Food Industry Practices: An Introduction*

**Core Skills:** There are opportunities in this Unit to develop the Core Skills components of *Communication*: Written Communication (Writing) at SCQF level 5 and *Numeracy* (Using Number) at SCQF level 5 and the Core Skill of *Working with Others* at SCQF level 5 although there is no automatic certification of Core Skills or Core Skills components.

**Context for delivery:** If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed in the subject area of the Group Award to which it contributes. This Unit is a mandatory Unit in the HNC Food Science and Technology. It is one of three specialist Units in food processing methods and is complementary to F6VG 34 *Food Manufacturing: Processing Practices at Ambient Temperatures* and F6VH 34 *Food Manufacturing: Processing Practices at Elevated Temperatures*.

## General information for centres (cont)

**Assessment:** This Unit can be assessed in a variety of ways. For example, assessment can consist of observation checklists of practical work supplemented by reports explaining the equipment used, the results of the practical work and conclusions from it. It would be possible for candidates to keep a laboratory log book of their practical work and use it to present assessment evidence.

## **Higher National Unit specification: statement of standards**

**Unit title:** Food Manufacturing: Processing Practices at Sub-Ambient Temperatures

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Please refer to *Knowledge and/or Skills for the Unit* and *Evidence Requirements for the Unit* after the Outcomes.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### **Outcome 1**

Conduct commercial chilling of foods

#### **Knowledge and/or Skills**

- ◆ Refrigeration systems and methods
- ◆ Refrigeration equipment
- ◆ Effect on micro-flora and enzymes
- ◆ Factors affecting the selection, conduct and efficiency of methods and equipment

### **Outcome 2**

Conduct commercial freezing and thawing techniques

#### **Knowledge and/or Skills**

- ◆ Freezing and thawing techniques
- ◆ Freezing and thawing equipment
- ◆ Effect on micro-flora
- ◆ Factors affecting the selection, conduct and efficiency of techniques and equipment

## **Higher National Unit specification: statement of standards (cont)**

**Unit title:** Food Manufacturing: Processing Practices at Sub-Ambient Temperatures

### **Evidence Requirements for the Unit**

Candidates will need to provide evidence to meet all the Knowledge and/or Skills items by showing that they can carry out practical work for four different food processing operations at sub-ambient temperatures, one of which must be chilling. Candidates should carry out the practical work using safe hygienic working practices to ensure food safety. This can be demonstrated by an observation checklist to show:

- ◆ effective planning and preparation for the practical task
- ◆ attention to personal hygiene
- ◆ safe use of equipment in accordance with the specific requirements of the items of equipment used
- ◆ cleaning and disinfection of equipment and surfaces

For each piece of practical work, candidates should provide evidence to show that they can:

- ◆ accurately record and present results using tables and graphs where appropriate and including all necessary calculations
- ◆ draw conclusions from the results including their applicability to industrial contexts

In addition, candidates must provide evidence to show that they can accurately explain:

- ◆ the items of industrial processing equipment used in a particular context and the functions that they fulfil: two items of equipment should be covered in each context
- ◆ the effect on micro-flora and enzymes
- ◆ factors which affect the selection, conduct and efficiency of operations and equipment in a particular context: two factors should be given in each case

### **Assessment Guidelines for the Unit**

This Unit can be assessed in a variety of ways. For example, candidates can be asked to provide a number of brief reports based on their practical work. They can present these in any suitable format. They could, for example, be encouraged to keep a laboratory log book or diary for their practical work and use this as the means of presenting evidence for assessment. This evidence can be supplemented by observation checklists to ensure that candidates have followed suitable practice when undertaking practical work.

## Administrative Information

<b>Unit code:</b>	F6VJ 34
<b>Unit title:</b>	Food Manufacturing: Processing Practices at Sub-Ambient Temperatures
<b>Superclass category:</b>	WM
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### History of changes:

Version	Description of change	Date

**Source:** SQA

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## Higher National Unit specification: support notes

### Unit title: Food Manufacturing: Processing Practices at Sub-Ambient Temperatures

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

### Guidance on the content and context for this Unit

This Unit is a mandatory Unit in the HNC Food Science and Technology. It is a practically based Unit and will allow candidates to appreciate the care taken by industry to ensure the production of foods for consumers which is both safe and of acceptable quality. It is one of three Units covering methods and equipment used in food manufacturing at different temperatures. The others are:

- ◆ F6VG 34 *Food Manufacturing: Processing Practices at Ambient Temperatures*
- ◆ F6VH 34 *Food Manufacturing: Processing Practices at Elevated Temperatures*

This Unit is designed to enable candidates to build on the introduction to sub-ambient processing methods in F6VE 34 *Food Industry Practices: An Introduction*. Nevertheless, the Unit is suitable for those who have not completed this Unit but have obtained the necessary background in other ways.

The Unit covers chilling and freezing methods and equipment as well as thawing techniques and equipment. Candidates are expected to be aware of the factors which influence both sets of activities.

These factors include:

- ◆ Reasons for chilling and freezing such as perishability, seasonal availability and ripening
- ◆ Factors affecting the safety and quality of chilled foods such as microbial activity, parasitic activity, enzymatic activity, organoleptic properties, O<sub>2</sub>, air humidity and temperature
- ◆ Factors affecting the safety and quality of frozen foods such as microbial activity, parasitic activity, enzymatic activity, fast and slow freezing rates, organoleptic properties, ice crystal growth and cell damage, freezer burn, volume change and chill injury and damage
- ◆ Nutrition
- ◆ Consumer requirements and cost factors
- ◆ Health and safety requirements
- ◆ Hazard Analysis Critical Control Points (HACCP)/food safety management systems

For Outcome 1, candidates should understand why chilling is carried out by industry paying particular attention to maintaining the safety and quality of processed foods. The Outcome could cover the main component parts of a mechanical refrigeration system such as:

- ◆ Compressor
- ◆ Condenser
- ◆ Evaporator
- ◆ Expansion valve

## Higher National Unit specification: support notes (cont)

### Unit title: Food Manufacturing: Processing Practices at Sub-Ambient Temperatures

and how the system is adapted for usage in direct and indirect refrigeration systems.

Pieces of industrial equipment could cover:

- ◆ Air blast chillers
- ◆ Cryogenic units for chilling

For Outcome 2, candidates should recognise why thawing is not simply the reverse of freezing with respect to heat flow, thermal conductivity, tempering and how it is carried out on a small scale to maintain the safety and quality of the foods involved.

Pieces of industrial equipment could cover:

- ◆ Air blast freezers, tunnel, fluid bed units
- ◆ Plate freezers vertical/horizontal
- ◆ Cryogenic units for freezing

Factors influencing thawing could cover:

- ◆ Packaging
- ◆ Temperature
- ◆ Humidity
- ◆ Freezer burn
- ◆ Growth of micro-organisms

This Outcome can also cover the design and operation of industrial units using:

- ◆ Thermal properties — air, water, steam, vacuum, Infra red (IR)
- ◆ Electrical properties — resistance dielectrics, microwaves

Modified atmosphere packaging

In addition both Outcomes can cover rules for usage of fridges and freezers such as:

- ◆ Location
- ◆ Temperature control
- ◆ Hygiene
- ◆ Food safety factors

For practical work, candidates should be able to present their results in a suitable manner. Where appropriate the presentation should include tables and graphs and candidates should carry out all the necessary calculations. Candidates should also interpret the results of their practical work by drawing conclusions from them. These conclusions can be used to supplement and reinforce their analysis of operations and equipment. Candidates should also comment on the differences between practical work on a pilot scale and food production on commercial scale.

## **Higher National Unit specification: support notes (cont)**

**Unit title:** Food Manufacturing: Processing Practices at Sub-Ambient Temperatures

### **Guidance on the delivery and assessment of this Unit**

This Unit is a practically based Unit which also covers important underpinning theoretical knowledge and understanding. Delivery methods should take account of this by ensuring that the material is always closely linked to activities in the food industry and the operations of organisations engaged in food processing.

When undertaking practical work, candidates should be made fully aware of good practice in terms of safe working practices, particularly cleanliness and hygiene. The practical work is likely to cover only some of the possible methods and techniques. The methods selected should be ones which will give candidates a good overall experience of the practical application of suitable methods, techniques and equipment. In this way they should be in a position to apply their experience to other techniques — either as part of their subsequent study or in industry. Candidates may work in groups during practical sessions although any summative assessment work should be done individually.

There is a variety of ways that this Unit can be assessed. For example, assessment can take the form of observation checklists (photographic and/or video evidence could be used to supplement the checklist) and evidence that candidates can record and present the results of their practical work using tables and graphs where appropriate and including all necessary calculations. Candidates should also draw some conclusions from the practical work, in particular about its applicability to larger scale industrial contexts.

Candidates can present their work in a report format which would enable them also to explain the items of industrial processing equipment used in a particular context and factors which affect the selection and conduct of operations and equipment in a particular context. The evidence should include referencing where appropriate.

However, other methods of presentation would be possible. Candidates could, for example, keep a laboratory logbook or diary during their practical work and use this as a basis for presenting all the evidence for assessment. They could use other presentation methods such as presentation software or make use of web 2.0 techniques. Assessment work can be undertaken as candidates work through the Unit and gathered together in a portfolio.

### ***Opportunities for developing Core Skills***

#### ***Communication: Written Communication (Writing) at SCQF level 5***

As part of their assessment work for this Unit, candidates are expected to maintain details of practical work. This can be done in a laboratory log book or diary and candidates will be expected to organise the content into a logical and effective structure. Candidates will, therefore, use written information to demonstrate their knowledge and understanding of relevant ideas and information. Candidates can also be asked to write up their practical work in a report style which can replicate that used in industry. In these cases, candidates can be expected to make sure that the report meets its intended purpose by a format and layout appropriate to an industrial readership.



## **Higher National Unit specification: support notes (cont)**

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### ***Numeracy (Using Number) at SCQF level 5***

As part of the practical work for this Unit, candidates are required to carry out practical work. They are expected to undertake calculations using scientific formulae and, using the Outcome of these calculations, draw conclusions about the results of their practical work. This will involve quantitative data over a range and candidates will be required to decide what numerical operations are to be carried out and the order in which to do them

### ***Working with Others (Working Co-operatively with Others) at SCQF Level 5***

The opportunities to gather evidence for this Core Skill component depend on the approach used for the practical work required by this Unit. Candidates are expected to carry out food processing operations using pilot plant equipment. They could do this in groups in which case they will have to work with others to identify the requirements of the practical work and to determine what roles and responsibilities each member will take in order for the work to be completed safely and hygienically. They will also need to organise their own contribution, alter it where appropriate and make suggestions to the others for the practical work. They will also have to take actions to encourage co-operative working during the practical activity such as providing support and encouragement for others involved in the task and helping to minimise any disagreements among group members.

## **Open learning**

This Unit could be delivered by Open Learning although candidates will have to have the opportunity to undertake practical work. Appropriate arrangements would need to be made for assessment and quality assurance.

## **Disabled candidates and/or those with additional support needs**

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements)

## General information for candidates

### **Unit title:** Food Manufacturing: Processing Practices at Sub-Ambient Temperatures

This Unit is a mandatory Unit in the HNC Food Science and Technology. It is one of three specialist Units in food manufacturing which you will take as part of your HNC. The others are:

- ◆ *Food Manufacturing: Food Processing at Ambient Temperatures*
- ◆ *Food Manufacturing: Food Processing at Elevated Ambient Temperatures.*

It follows on from the two introductory Units ie, *Food Industry Principles: An Introduction* and *Food Industry Practices: An Introduction* — particularly the second of these. The *Food Industry Practices: An Introduction* Unit introduced you to methods of food processing where you learnt that there are three main types depending on the temperature involved.

This Unit covers food processing at sub-ambient temperatures. You will look at processing operations involving techniques of chilling, freezing and thawing.

This is a practical Unit and you will be involved in practical work using pilot plant equipment. This will allow you to develop the skills and understanding you have already gained from *Food Industry Practices: An Introduction*. In this way, you will get more practical, hands-on experience of the kind you will need when you take up employment in the food industry. You will find out about the items of equipment used in different methods of processing at ambient temperatures and the factors which affect the selection of equipment.

You will already know about the importance of safe working practices and hygiene in food processing. You will be expected to conduct your practical work in a manner which meets all health, safety and hygiene requirements. You will be observed while you are doing it in order to ensure that you do work in accordance with these.

The assessment for this Unit will require you to carry out four different food processing operations at sub-ambient temperatures, one of which will be chilling. You will also be required to record the results of your practical work and draw conclusions from them, for example about how they may apply in large-scale industrial contexts. You will also be expected to explain the items of equipment used and factors affecting the selection of equipment and the method of processing.

You will have succeeded in meeting all the requirements of this Unit if you pass the assessments.

After you have completed this Unit, you could consider other areas such as Food Hygiene, HACCP and Health and Safety.