



Guide to the Storage & Handling of Frozen Foods

published by
The British Frozen Food Federation



British Frozen Food Federation

Registered Office: Warwick House, Unit 7, Long Bennington Business Park, Main Road, Long Bennington, Newark, Nottinghamshire NG23 5JR

Tel: 01400 283090 Fax: 01400 283098 Websites: www.bfff.co.uk www.coolcooking.co.uk

A company limited by guarantee. Registered in England and Wales No. 7687541 VAT Reg. No. GB 115 5466 23

Foreword to 2017 Update

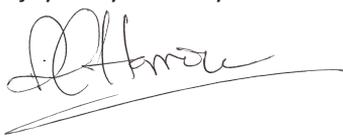
Since 1994, the Guide to Storage and Handling of Frozen Foods, has facilitated understanding between the industry and the enforcement authorities, and a common approach to the frozen food supply chain.

British Frozen Food Federation works on behalf of the whole supply chain for the frozen food industry, involving producers, retailers, wholesalers, distributors, importers and companies providing services to the industry. We believe a key part of our mission is to facilitate a more effective and efficient supply chain and this guide helps to achieve that.

Advances in technology and changes in European legislation over recent years prompted us to review and update this well-established guide, which has been the bedrock of ensuring both understanding and compliance by supply chain operators and consistent, even application of the Regulations by enforcement.

Legislation relevant to frozen foods actually seeks to ensure standards of quality rather than food safety as the freezing process renders frozen foods as one of the safest forms of food preservation.

We hope that our revisions to the Guide enable a continuation of the harmony enjoyed by industry and enforcement.

A handwritten signature in black ink, appearing to read 'Richard Harrow', with a long horizontal line underneath.

Richard Harrow
Chief Executive
British Frozen Food Federation

© British Frozen Food Federation 2007, 2011, 2017.

No part of this publication may be reproduced in any form without prior written permission from the British Frozen Food Federation

CONTENTS

INTRODUCTION

SECTION 1 GUIDE TO THE QUICK-FROZEN FOODSTUFFS REGULATIONS

- A. The Regulatory Structure
- B. Temperature Monitoring Systems

SECTION 2 RECOMMENDED PROCEDURES FOR THE COLD CHAIN

- A. Manufacturing
- B. Primary Cold Stores
- C. Primary Distribution
- D. Secondary Cold Stores (Including RDC's)
- E. Local Distribution
- F. Retail Outlets
- G. Cash and Carry Outlets
- H. Caterers

SECTION 3 DUE DILIGENCE

ANNEXES

- I The Control Procedure
- II Specifications for Temperature Measuring Systems
- III. Temperature Monitoring Procedures
- IV. Sampling Procedures
- V. Product Temperature Measurement
- VI. Primary Authority Advice

APPENDIX

References and Other Relevant Texts

INTRODUCTION

The Guide to the Storage & Handling of Frozen Foods (the 'Gold Book') was originally produced in 1994. That 1994 guide, in turn, owed much to its predecessor, the UKAFFP Code of Recommended Practice for the Handling of Quick Frozen Foods (first published in 1976). The 1994 Guide was produced to take account of developments with respect to EU and UK legislative changes on quick-frozen foods, which it explained in detail. Revision of the 1994 text was considered necessary in 2007 and again in 2012 to reflect the many legislative changes over the years, including some changes specifically relating to frozen foods. This latest update (2017) is intended to once again bring the Guide fully into line with other texts.

Unless otherwise specified, all references in the text to "frozen food" also include "quick-frozen food" and references to "quick-frozen food" relate to products as defined in the Quick-frozen Foodstuffs Regulations (1990 and 2007).

The quality of frozen foods owes everything to the integrity of the product, its packaging and its temperature throughout the cold chain. Starting with quality raw materials, modern freezing techniques and an unbroken chain of low temperature storage and distribution can preserve the original

fresh food characteristics for long periods of time in a way that no other process can.

In the UK market, the majority of products are not labelled and marketed as quick-frozen and are therefore not covered by the Quick-frozen Foodstuffs Regulations. **However, the practices recommended in this booklet apply in principle to the manufacturers, storers, distributors and handlers of all frozen foods, although a distinction is made between the temperature requirements for quick-frozen foods and those necessary for other frozen foods.**

Quick-freezing and the lower temperatures associated with quick-frozen foods provide qualitative attributes as well as the facility under the Quick-frozen Foodstuffs Regulations to label them as such. Such labelling also brings with it the obligation to observe the detailed requirements of the Regulations. Other frozen foods (e.g. butter stored in bulk, large cuts of meat or poultry) may be kept at temperatures more appropriate to their own particular needs. A temperature of -18°C for quick-frozen foods is the norm (subject to suitable operational tolerances) and is sufficiently cold enough to ensure standard shelf life applied will be appropriate with regard to quality. For other frozen

products, a warmest temperature of -12°C is generally recognised as representing good practice. However, for long term storage -18°C is critical and should be met in order that standard industry shelf life periods can be applied. In any event, it should be stressed that there is no risk of microbiological growth in any frozen product unless the temperature is allowed to become substantially warmer than -12°C for any significant period of time.

It should be noted that the Quick-frozen Foodstuffs Regulations do not apply to ice cream and that, whilst most of the procedures outlined in this Guide may be very helpful to manufacturers, distributors and retailers of ice cream, the actual temperatures at which ice cream should be stored are usually colder than those suitable for frozen foods.

The Annexes refer to the procedures which enforcement officers can be expected to follow in accordance with the requirements of the Quick-frozen Foodstuffs Regulations and the Codes of Practice^{1*} (and the associated Practice Guidance) for their enforcement. It is recommended, as a matter of due diligence, that similar procedures are followed by all operators handling quick-frozen products and, as a matter of good operating practice, by those handling other frozen foods.

It is, of course, possible that operators will decide to use other methods for temperature checking and control. Where this is permitted by the regulations and to the extent that such methods can be shown to be of equivalent value there is no reason why they should not. However, it may be necessary to demonstrate the validity of such methods in order to be able to establish an eventual defence of due diligence.

1 * For detailed references, see Appendix

SECTION 1

GUIDE TO THE QUICK-FROZEN FOODSTUFFS REGULATIONS

A. The Regulatory Structure^{2*}

i) General

The Quick-frozen Foodstuffs Regulations 1990, (SI/1990/2615), enacted under the Food Safety Act 1990, came into force on 10 January 1991, implementing for Great Britain the requirements of Council Directive 89/108/EEC. The Quick-frozen Foodstuffs (Amendment) Regulations 1994 (SI 1994/298) came into force on 1 September 1994, detailing mandatory temperature monitoring and measurement requirements from Commission Directives 92/1/EEC and 92/2/EEC.

There were separate parallel regulations for Northern Ireland.

Commission Regulation (EC) No 37/2005 of 12 January 2005 (on the monitoring of temperatures in the means of transport, warehousing and storage of quick-frozen foodstuffs intended for human consumption) came into force on 2 February 2005, superseding certain earlier requirements.

In England, the national 1990 Regulations and 1994 Amendment Regulations were revoked, and replaced by the Quick-Frozen Foodstuffs (England) Regulations 2007. These Regulations, came into

force on 1 March 2007 and combined the necessary enforcement powers for the 2005 European Regulation, with continuing requirements from the 1990 and 1994 Regulations.

There were corresponding regulations for Wales and Northern Ireland, but a different approach was taken in Scotland. The earlier regulations applying to Scotland were not revoked, and the Quick-frozen Foodstuffs Amendment (Scotland) Regulations 2007 (SSI 2007/106), which came into force on 16 March 2007, further amended the 1990 Great Britain Regulations, as they apply to Scotland. Minor amendments in respect of definitions have since been made by the respective Food Information Regulations in each country, taking effect on 13th December 2014.

A specific Code of Practice was published in 1994 under the Food Safety Act (Revised Code of Practice 12), dealing with the enforcement of temperature monitoring and temperature measurement, but this was superseded by updated Food Safety Act 1990 Codes of Practice and associated Practice Guidance.

Enforcement of temperature monitoring for the purposes of Quick-Frozen Foodstuffs are not provided for in the current England (2017) or

Northern Ireland (2016) codes of practice. There is however a section in the Wales Practice Guidance (2012) and in the Scotland Practice Guidance (2015).

These notes constitute a simplified guide to the Regulations and the Codes of Practice, all of which should be obtained, read thoroughly and retained.

The Regulations do not apply to products not labelled “quick-frozen”, nor to ice cream, nor to products that are not intended for human consumption.

A manufacturer can therefore quick-freeze products and, provided they are not described as “quick-frozen”, the requirements of the Regulations do not apply.

Moreover, caterers do not sell quick-frozen foods, since they prepare the food for sale in a chilled or heated form. They are therefore not subject to the requirements of these regulations, but suppliers of quick-frozen foods to caterers are so subject.

It should be noted that the primary offence is that of selling a quick-frozen foodstuff which does not fulfil the conditions of the Regulations, but it should also be noted that “each food operator handling a quick-frozen foodstuff intended for placing on the market for human consumption **shall ensure during each stage**

during which it is within his care and control that the equipment used in respect of that foodstuff is such as to ensure that no act or omission on his part would cause the placing on the market of the foodstuff for human consumption to contravene these Regulations.” It is also an offence not to have installed appropriate temperature monitoring and measuring equipment where the Regulations so require (See B on page 9).

ii) Raw Materials

The Regulations prescribe general conditions for the quality of raw materials, the use of appropriate equipment and the promptness of freezing.

iii) Quick-Freezing

The Regulations define a quick-frozen foodstuff as one “which has undergone a freezing process known as ‘quick-freezing’ whereby the zone of maximum crystallisation is crossed as rapidly as possible, depending on the type of product”, **and** “which is labelled for the purpose of placing on the market to indicate that it has undergone that process”.

It must be prepared and frozen “with sufficient promptness, and by use of appropriate technical equipment, to minimise any chemical, biochemical and microbiological changes to the food comprised in it”.

iv) Packaging

The packaging of quick-frozen food must be:

“... suitable to protect it from microbial and other forms of external contamination and against dehydration” and it is necessary that “the quick-frozen foodstuff has remained in such pre-packaging up to the time of placing on the market”.

v) Labelling

The Regulations require a quick-frozen foodstuff which is intended for supply, without further processing, to the ultimate consumer or to a catering establishment to be labelled (in addition to the sales name) with:

- the description “quick-frozen”;
- the date of minimum durability (“Best Before” or “Best Before End” date);
- an indication of the maximum advisable storage time (Star Marking is appropriate);
- an indication of the temperature at which, and/or the equipment in which, it is advisable to store it;
- a batch or lot mark;
- a message of the type “Do not re-freeze after defrosting”.

Any other quick-frozen food (i.e. labelled as such, but not intended for supply without further processing)

must be labelled with:

- the description “quick-frozen”;
- a batch or lot mark;
- the name or business name and address of the manufacturer or packer, or of a person who places that foodstuff on the market established within the Community.

These specific labelling requirements must be seen alongside those detailed in the EU Regulation 1169/2011 on the Provision of Food Information for Consumers (EU FIC). This regulation came into force on 13 December 2014.

vi) Temperatures

The temperature control requirements of the Regulations apply only after temperature stabilisation. Thereafter, products are to be kept at temperatures of -18°C or colder with the following exceptions:

- During transport (including local distribution), a tolerance for brief periods of 3°C (i.e. not warmer than -15°C).

It should be noted that “local distribution” means that part of the distribution chain in which the product is delivered to the point of placing on the market for retail purposes (including placing on the market to a catering establishment), and

that the same temperature tolerances apply to back-up cold rooms and up to the point of sale in retail outlets.

- In retail cabinets, good storage practice is specified with a tolerance of 6°C (i.e. not warmer than -12°C).

B. Temperature Monitoring Systems

(See also Annexes II and III)

i) The Regulations concern **product temperatures (i.e. not air temperatures)**. However, there is a legal requirement to monitor air temperatures which could also be central to the establishment of a defence of due diligence in the event of a prosecution.

ii) However, as stated in the Food Safety Act Codes of Practice (and associated Practice Guidance), “Air temperature monitoring provides an indication of the performance of a refrigeration system over time, and a single reading at any one time will not necessarily be an indication of product temperature. Air temperature monitoring records are an indication of temperature history, including defrost cycles, door openings, breakdowns etc. They must be regarded as a guide to how a particular system is functioning”.

The Wales Practice Guidance and Scotland Practice Guidance also state:

“The initial stage of any check to monitor compliance with the Regulations should include a discussion with the proprietor or other responsible person about the nature of the temperature monitoring equipment and whether it meets any relevant EN standards, position of temperature monitoring sensors, how temperatures that they record relate to the actual temperature of the food, and how temperature control is achieved”, so prior calibration of refrigeration equipment, under normal operating conditions, may be necessary. However, no reference to this is made in either the England or Northern Ireland Practice Guidance.

iii) Each food operator (manufacturer, cold store operator, distributor or retailer) handling quick-frozen foods must establish air temperature monitoring procedures in line with the Regulations and the Code of Practice (See also Annex III). These include:

a) Cold Stores and Distribution

“The means of transport [other than local distribution], warehousing and storage of quick-frozen foodstuffs shall be fitted with suitable recording instruments to monitor, at frequent and regular intervals, the air temperature to which the quick-frozen foodstuffs are subjected” [for specifications see Annex II].

The frequency of temperature readings should be such as to provide a confident measure of the functioning of the equipment. Records must be kept “for one year or for a longer period taking into account the nature and the shelf life of the quick-frozen foodstuffs.”

b) Local Distribution

In local distribution vehicles: “the air temperature in the course of local distribution, shall only be measured by at least one easily visible^{3*} thermometer”. However, it should be noted that this is a minimum and a greater number of thermometers may be used.

c) Cold Rooms in Retail Outlets

A retail back-up cold room enjoys the same temperature tolerances as apply to local distribution. However, the Regulations require that a back-up cold room bigger than 10m³ in size “shall be fitted with suitable recording instruments to monitor, at frequent and regular intervals, ...”. Furthermore, cold store operators are required to keep records of air temperatures (see Cold Stores & Distribution above).

For a cold store facility with a capacity of less than 10m³ [used for storing stock in retail outlets], the requirement is that “the air temperature in the cold store

is measured by an easily visible thermometer”.

d) Retail Outlets

In open retail display cabinets: “... at least one easily visible* thermometer” and “the thermometer shall indicate the temperature at the air return side at the level of [the maximum load line]”.

In other retail cabinets: “... at least one easily visible* thermometer”.

³ * to an operator and an enforcement officer

SECTION 2

RECOMMENDED PROCEDURES FOR THE COLD CHAIN

A. Manufacturing

i) Freezing is an excellent method of preservation. It inhibits the growth of bacteria and slows down the biochemical reactions, which occur in non-frozen food.^{4*} It does not, however, improve the quality of food so the selection of sound and wholesome raw materials is of prime importance.

ii) Raw materials must be held under such conditions and for such time that natural deterioration is reduced to a minimum. Recommended temperatures for perishable raw materials normally lie between -1°C and 8°C dependent upon the product and should reflect the requirements of the European hygiene regulations (EC Regulation 852/2004 and EC Regulation 853/2004) and the national Food Hygiene Regulations, where relevant.

iii) After processing or cooking, the food should be cooled quickly to below 10°C and thereafter frozen as quickly as reasonably possible. After cooking, if cooling cannot take place immediately, the food should be held at a temperature warmer than 63°C until it can be cooled.

iv) Immediately after cooling, the

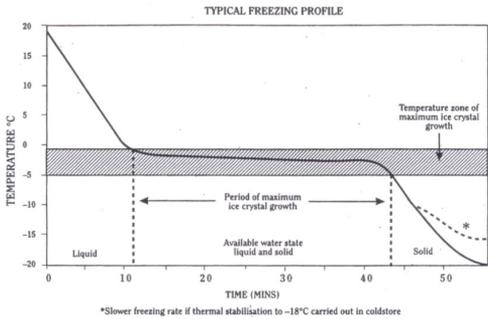
food should be frozen by a method which ensures that the temperature at the thermal centre passes quickly through the zone of maximum crystallisation. For most products this zone lies between -1°C and -5°C. The requirement for quick-frozen food is that this should be carried out “as quickly as possible depending on the type of product”, i.e. by the use of adequately dimensioned freezing or hardening tunnels (see graph).

Care should be taken to ensure that blast freezing processes are not inadvertently accelerated as this could lead to product being removed prior to the temperature at the thermal centre passing through the zone of maximum crystallisation.

v) The quick-freezing and thermal stabilisation processes are not complete until the temperature throughout the product has reached -18°C (optimally the same for other frozen products, but in any case, at least as cold as -12°C). The final thermal stabilisation needed to bring all parts of the product to the required temperature may be carried out in a factory or an off-site cold store.

⁴ * It should be noted however that for some primary meat products certain biochemical changes need to take place before freezing to avoid toughness

vi) It must be remembered that, in respect of the Regulations, quick-freezing is not complete until the product has been thermally stabilised and labelled “quick-frozen”.



The processes of (quick) freezing and temperature stabilisation and labelling may be separated if it is necessary, for example, initially to pack into bulk for later re-packing into retail packs (as with seasonal products such as peas). Care should be taken to ensure that any temperature rise between the two processes is as small as possible. In particular, the product should not be allowed to re-cross the zone of maximum crystallisation during re-pack or it will cease to fulfil one of the preconditions for a quick-frozen product.

vii) Manufacturers should establish cooling curves for the time taken to achieve stabilisation of product temperature at -18°C (or -12°C for non quick-frozen foods if appropriate).

viii) Manufacturers are responsible for the quality of raw materials, promptness of freezing and for the appropriate packaging and labelling of frozen foods. Owners of ‘Own Label’ brands may also be responsible for some of these areas of control where they dictate their requirements to the manufacturer (See Section 3 “Due Diligence”).

ix) Frozen foods should be totally enclosed in odour- and taint-free packaging of good quality in order to:

- prevent contamination of the product by exposure or handling;
- protect the product against normal transit and storage hazards;
- inhibit dehydration by incorporation of a moisture/ vapour barrier.

Packaging materials must also conform with the requirements of legislation relating to food contact materials.

x) All outer packaging should carry clear product identification and should be coded for stock rotation and traceability purposes. For manufacturers’ branded products in the foodservice supply chain, attention is drawn to the guidance notes for outer case labelling from the British Frozen Food Federation (“Into the Light”) *5.

5* For detailed references see Appendix

xi) The saleable unit (whether outer carton or inner pack) should be marked for traceability purposes with an appropriate identification code designed to enable the producer to establish:

- the date of production;
- the location of the producing factory;
- reference to daily production records, including where necessary time/shift, etc, and other circumstances of manufacture.

This information, together with any production details, should be made available on request to any enforcement officer having reasonable cause to require such information in relation to the quality of the product and also to any retailer or caterer if circumstances warrant it.

The unit of sale must also carry details of recommended storage times (“Best Before” or “Best Before End” date).NB. There may also be mandatory requirements under specific product hygiene regulations.

xii) EU Regulation 1169/2011 on the Provision of Food Information for Consumers (EU FIC) requires that frozen foods are marked with a “Best Before” date.

It is the responsibility of the manufacturer or the owner of the brand to decide on the overall shelf life of the product when printing

the “Best Before” date on the pack. Guidelines for products of different types exist, but shelf life may vary due to production, packaging and other factors, which may need to be taken into account.

“Best Before” dates are indicative of the ‘high quality’ life of frozen foods and generally have no significance for health or food safety. Frozen foods are long life products that, subject to good operating practices, will not suffer from microbial spoilage and pose no health hazard when kept at the temperatures recommended in this Guide.

The introduction of EU Regulation 1169/2011 (EU FIC) removed the requirement for the “Best Before” date, or an indication of where it was to be found to appear in the same field of vision as the statutory name and quantity indication. Therefore the “Best Before” date may now be printed anywhere on pack.

The “Best Before” date may be in the form “Best Before End Year” (where the date is at least 18 months hence) or “Best Before End month/year” or “Best Before day/month/year”. It should be noted that the latter option may make stock control more burdensome (but shelf life indication may also serve the purpose as a lot mark). It is recommended that, adjacent to the “Best Before” date, a statement should be printed

such as "Keep Frozen" or "See the star marking panel for storage instructions". It is essential to emphasise to consumers the need for correct storage if the product is to retain its high quality for the requisite period of time. Format can vary but where it is appropriate and in association with storage instructions the relevant detail should be given. This may be "Keep Frozen, Do Not Refreeze Once Defrosted" or a star marking panel. The format below is recommended for a star-marking panel:

STORAGE INSTRUCTIONS			
FOOD FREEZER	*	****] UNTIL BEST BEFORE DATE
STAR MARKED FROZEN FOOD COMPARTMENT	*	***	
ICE MAKING COMPARTMENT		**	ONE MONTH
REFRIGERATOR		*	ONE WEEK
			THREE DAYS
			24 HOURS
	* should be -18C or colder		

B. Primary Cold Stores

i) These are generally stores used for long term storage of frozen foods in which air temperatures should ideally be between -20°C and -28°C. Excessive product temperature fluctuations, either in range or frequency, are undesirable as they may lead to serious dehydration of the food and to other forms of quality deterioration. Although temperature fluctuations are generally less harmful at lower storage temperatures, significant

variations around the set point in the air temperature should be avoided and the frequency of variations kept to a minimum.

ii) Intakes into primary cold stores, whether from an adjacent factory or from some other place, should be made with the minimum exposure of frozen foods to outside temperature conditions. During the unloading of the vehicle, frozen foods should not be exposed to direct sunlight, wind or rain and as much of the operation as possible (e.g. posting, strapping of pallets, etc) should be done within the store. Pallets should be stacked to allow free air circulation.

iii) To reduce holding times in the supply chain, the thermal stabilisation process may be carried out either at the manufacturer's premises or be completed at an off-site (primary) cold store (See "Manufacturing" above). This would not be appropriate however for products which are more sensitive to temperature fluctuations and would not be recommended across a mixed ownership supply chain.

iv) Where (iii) does not apply and product received at a primary cold store is already "quick-frozen" (i.e. after thermal stabilisation), it should be at -18°C^{6*} or colder. Other frozen products should be no warmer than -12°C.

Note however that the ATP Agreement^{7**} requires that temperatures in international transport should be no higher than:

Ice cream	-20°C
Frozen or quick (deep)-frozen fish, fish products, molluscs and crustaceans and all other quick (deep)-frozen foodstuffs	-18°C
All frozen foodstuffs (except butter)	-12°C
Butter	-10°C

v) Loading of vehicles should take place with the minimum exposure of foods to outside temperature conditions. As much as possible of the operation (e.g. removal of pallet posts, etc) should be done in the cold store. The required temperature for delivery into the subsequent distribution chain will vary with the product and handling methods but the product must be sufficiently cold to allow for any normally expected rise in temperature during distribution to the point of delivery.

vi) Product temperatures should be checked against air temperatures under normal operating conditions and controls put in place so that actual air and product temperatures can subsequently be checked as appropriate.

vii) Cold store operators should keep records of air temperature (for one

year or for a longer period taking into account the nature and the shelf life of the quick-frozen foodstuffs) for inspection by an enforcement officer (or by the owner of the goods on request).

C. Primary Distribution

i) Primary distribution vehicles are those vehicles, which carry frozen foods from one cold store to another (except deliveries to a back-up cold room at a retail outlet which are considered to be part of “local distribution” - see page 17).

ii) Frozen foods are most vulnerable to temperature rise during the loading and unloading of distribution vehicles. The following methods may be used, where appropriate, to reduce any temperature rise to a minimum:

- Pre-cooling of vehicles before loading.
- Cooling units should not be operated with the doors open.
- The use of loading/unloading ports wherever possible with the vehicle in direct contact with the port.
- Where ports are not available, use of covered bays and the screening of vehicles from the effects of direct sun light, wind and rain.

^{7 **} Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage (drawn up by the Inland Transport Committee of the United Nations Economic Committee for Europe); for detailed references see Appendix

- Minimisation of loading/unloading time by the use of pallets and mechanical handling equipment.
- Sorting and pre-assembly of loads should be carried out in a temperature-controlled environment before loading.
- Loading and unloading as rapidly as possible, leaving product on the bay no longer than strictly necessary.

iii) Appropriately trained operators of primary distribution vehicles should ensure that they are satisfied with the temperature control of the relevant products. They should also check cold store temperature monitoring records and, if necessary, product temperatures if temperature abuse is suspected.

Product should be received at a temperature of -18°C^{8*} or colder for quick-frozen foods (-12°C^* or colder for other frozen foods).

NB Prior agreement should have been reached between the supplier and the distributor on the method of further checking and the acceptance/rejection procedure to be followed should samples fail to meet the temperature control requirements.

iv) Primary distribution vehicles should be designed to be capable of maintaining frozen foods at the same

temperature as those in the primary cold store and operated in such a way that the final delivery temperature is not warmer than -15°C (after due allowance for a 3°C upward tolerance for 'brief periods'). This should, under best practice, allow for the receiving distribution centre to apply re-handling.

As part of environmental impact improvement programmes, supply chains have undoubtedly become more complex with changes in temperature regimes being applied to the same product based on the location and of the overall supply chain delivery requirement. For instance, in catering and hospitality sectors it is not uncommon for products to be supplied in primary distribution as frozen but picked and distributed for secondary distribution in chilled or ambient distribution networks. In such instances, after being received as chilled or ambient products as appropriate, the relevant revised shelf life should then be applied as per the specified instruction for use.

v) Vehicle operators must keep records of air temperature for at least one year but longer periods may be more appropriate taking into account the nature and the shelf life of the quick-frozen foodstuffs. These records should be retained for inspection by an enforcement officer (or by the owner of the goods

on request). The records may be kept with the vehicle or at a central location.

vi) Where distribution vehicles are involved in international transport, the requirements of the ATP Agreement should be followed, regarding temperatures and vehicles.

D. Secondary Cold Stores (including RDCs)

i) Secondary cold stores should be designed to achieve an air temperature between -20°C and -28°C and be capable of bringing down quick-frozen product temperatures to -18°C , given the 3°C tolerance allowed in primary distribution; otherwise maintaining product temperatures at -18°C or colder for quick-frozen and -12°C or colder for other frozen foods.

ii) Appropriately trained operators should ensure that they are satisfied with the temperature control of the relevant products. They should also check the vehicle temperature monitoring records and, if necessary, product temperatures if temperature abuse is suspected.

iii) Quick-frozen product should be received at a temperature of -15°C^{9*} or colder, given due allowance for a 3°C upward tolerance for 'brief periods', (-12°C^* or colder for other frozen foods).

NB Prior agreement should have been reached between the supplier and the cold store operator on the method of further checking and the acceptance/rejection procedure to be followed should samples fail to meet the temperature control requirements.

iv) Product temperatures should be checked against air temperatures under normal operating conditions and controls put in place so that actual air and product temperatures can subsequently be checked as appropriate.

v) Cold store operators should keep records of air temperature for at least one year but longer periods may be more appropriate taking into account the nature and the shelf life of the quick-frozen foodstuffs. These records should be retained for inspection by an enforcement officer (or by the owner of the goods on request).

vi) Loading of a local distribution vehicle should be at $-18^{\circ}\text{C}^{10*}$ or colder (quick-frozen food); at -12°C^* or colder (other frozen food)

E. Local Distribution

i) Local distribution vehicles are used for the final delivery to the retail or catering outlet. They are usually engaged in multi-delivery work and the refrigeration capacity required is dictated by

9 * Follow the procedures outlined in Annexes IV and V

10 * Follow the procedures outlined in Annexes IV and V

the frequency and duration of door openings rather than by heat transfer through the vehicle body.

With multi-delivery work maintaining -18°C is not always practical but vehicles should be designed and operated in such a way that quick-frozen foods can be delivered at -15°C and other frozen foods at -12°C , or colder in each case. In order to achieve these temperatures, it is suggested that the vehicle interior should be pre-cooled. The use of air (or plastic strip) curtains should also be considered.

ii) Clear operating standards should be laid down. Staff should be given adequate training and supervision in the use of vehicles and associated equipment.

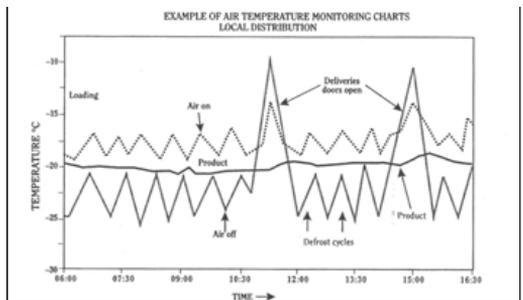
iii) Appropriately trained operators should ensure that they are satisfied with the temperature control of the relevant products. They should also check cold store temperature monitoring records and, if necessary, product temperatures if temperature abuse is suspected.

iv) The temperature of the product on receipt from cold stores should be $-18^{\circ}\text{C}^{11*}$ or colder for quick-frozen foods (other frozen products should be -12°C^* or colder).

NB Prior agreement should have been reached between the

supplier and the distributor on the method of further checking and the acceptance/rejection procedure to be followed if samples fail to meet temperature control requirements.

v) Air temperature may be measured at the start of the journey and thereafter monitored at intervals by visual inspection of "at least one easily visible thermometer" (See Annex II). It is recommended that the sensor be located such that it indicates the temperature of the return air. The thermal load of the sensor may be increased to provide a 'damped' response. This helps to smooth out the wide fluctuations in air temperatures (see graph below) caused by the frequent opening of doors



Designs of equipment for the measurement and monitoring of air temperatures will vary. It is common practice to have the dial read out and or printer in the driver's cab of a rigid vehicle or direct drive vehicle.

11 * Follow the procedures outlined in Annexes IV and V

However, on vehicles where the trailer is separate from the cab these units may be presented on the outside of the trailer unit. In either case they should be readily accessible.

Data may be collated on the vehicle using a data logger and downloaded when the vehicle returns to an appropriate location. Downloads may be completed directly via cable or memory stick / disk or indirectly using technologies such as radio frequency transmission of the data.

Where continuous monitoring of temperatures is in place, care is required when reviewing the data. Ideally any system installed will facilitate the identification of the status of the vehicle or chamber, particularly in a vehicle with the capability of being split into different temperature zones of variable sizes. Whether automated or not, records of the status of the vehicle should also be maintained – e.g. whether on a return journey with or without product, product zone run under chilled, frozen or quick-frozen regime, etc.

vi) All frozen products should be delivered to retail outlets at $-15^{\circ}\text{C}^{12*}$ or colder for quick-frozen foods (given due allowance for a 3°C upward tolerance for 'brief periods'), or -12°C^* or colder for other products.

F. Retail Outlets

F.1 Delivery

i) Appropriately trained operators should ensure that they are satisfied with the temperature control of the relevant products. They should also, if necessary, check product temperatures if temperature abuse is suspected.

ii) Product should be received at a temperature of $-15^{\circ}\text{C}^{13*}$ or colder for quick-frozen foods (given due allowance for a 3°C upward tolerance for 'brief periods'), or -12°C^* or colder for other products.

NB Prior agreement should have been reached between the supplier and the distributor on the method of further checking and the acceptance/rejection procedure to be followed should samples fail to meet the temperature control requirements.

F.2 Back-up Cold Rooms

i) Back-up cold rooms and storage cabinets provide the opportunity for better operational procedures, especially for order reception, price marking and stock control. They also provide a reserve in the event of display cabinet failure.

ii) The required capacity of back-up

12 * Follow the procedures outlined in Annexes IV and V

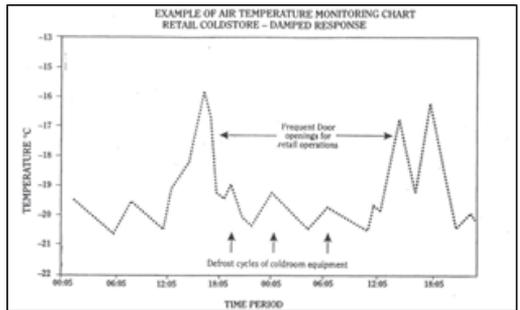
13 * Follow the procedures outlined in Annexes IV and V

cold rooms and cabinets depends on many factors such as: the turnover and size of display cabinets, the range of products carried, the number of suppliers, their service and terms and the store policy.

iii) It is recommended that all back-up cold stores should have a readable thermometer which has a resolution of at least 1°C. Back-up cold rooms bigger than 10m³ in size used for the storage of quick-frozen foods will need a suitable air temperature monitoring system (see Annex II).

Furthermore, cold store operators storing quick-frozen foods are required to keep air temperature records and these should be available for inspection by an enforcement officer. Records of air temperature should be kept for at least one year or for a longer period taking into account the nature and the shelf life of the quick-frozen foodstuffs.

iv) The thermal load of the sensor may be increased to provide a 'damped' response. This helps to smooth out the wide fluctuations in air temperatures caused by the frequent opening of doors in cold rooms (see graph).



v) Access doors to walk-in cold rooms and large reach-in cabinets should be fitted with an integral release device to ensure that the door can be opened from the inside. The fitting of a personnel alarm and emergency internal lighting is recommended.

vi) Consideration should be given to the use of air veils, inner swing doors and curtains to reduce cold air losses during door openings and to the installation of under-floor heating for walk-in cold rooms for the prevention of condensation and/or frost heave. Consideration should also be given to the fitting of low voltage heater gaskets to access doors.

F.3 Retail Cabinets

i) When loading cold stores and display cabinets, stock rotation is important and should be on the basis of 'first in, first out' or by date/batch code as appropriate.

ii) No part of a pack should be stacked higher than the load limit line in an open display cabinet, nor in

front of the load limit line of a multi-tier display cabinet. When loading a frozen food display cabinet, care must be taken to avoid restricting or blocking the discharge and return air grills with packages, loose packaging material, loose pricing tickets, etc.

iii) Display cabinets are designed only to maintain the temperature of frozen foods. Non-frozen foods should not be placed in a frozen display cabinet.

iv) Frozen foods should be displayed and stored in a display cabinet designed for the purpose and complying with recognised standards (eg BS EN ISO 23953:2005, superseding BS EN 441:1995). Such standards specify requirements for the construction, characteristics and performance of refrigerated display cabinets used in the sale and display of foodstuffs

v) When display cases require a remote condensing unit, this must be carefully selected by the refrigeration contractor, be suitable for use under the conditions in which it has to work and be able to achieve the heat extraction requirements specified for the display cabinet.

vi) Equipment should be calibrated according to the relationship between air and product temperature under normal operating conditions. Records of test results should be kept for inspection as necessary.

vii) Air temperature in store refrigeration should be monitored by means of at least one easily visible thermometer. In open display cabinets this should be "... at the air return side at the level of the maximum load line".

This does not mean that the read-out has to be visible to the consumer, but it can be available from a remote control point, which provides data from all the cabinets connected to the system. The sensor is not required to be positioned at the load line as long as the read-out provided is indicative of the temperature at the load line.

viii) Records should be kept of temperature checks made. These may be by a 'yes/no' system of control, where a pre-set temperature monitoring system is used. Records may be made manually or automatically.

ix) Where a manual check system may be utilised, both the date of check and the person responsible for the check should be noted. Exception reports may be considered for this purpose.

x) Return air temperature in cabinets should be maintained at sufficient level to keep product at -12°C or colder in accordance with the air/product temperature calibration as in (vi) above.

G. Cash and Carry Outlets

i) Cash and Carry outlets which supply retailers and caterers may have cold rooms and/or stand-alone cabinets. The Quick-Frozen Foodstuffs (England) Regulations 2007 (and corresponding regulations for Wales, Scotland, and Northern Ireland) define “retail display cabinet” to mean any cabinet from which a quick-frozen foodstuff is “placed on the market for retail purposes or in the course of a cash-and-carry business”.

ii) It is important to note that, although cabinets in cash and carry businesses will be allowed similar temperature tolerances for quick-frozen foods as those in retail outlets, these cabinets may not in themselves be the point of retail sale. It will be necessary, therefore, for temperature records to be made, dated and kept. These may be by a ‘yes/no’ system of control, where a pre-set temperature monitoring system is used. Records may be made manually or automatically.

iii) Where a manual check system may be utilised, both the date of check and the person responsible for the check should be noted. Exception reports may be considered for this purpose.

iv) Cold rooms in cash and carry outlets do not deliver product to the point of retail sale and do not

therefore benefit from the tolerances applied to local distribution. They should be capable of bringing down quick-frozen product temperatures to -18°C as necessary bearing in mind the 3°C tolerance allowed in primary distribution; otherwise maintaining product temperatures, at -18°C or colder for quick-frozen and -12°C or colder for other frozen foods.

v) Appropriately trained operators should ensure that they are satisfied with the temperature control of the relevant products. They should also check vehicle temperature monitoring records and, if necessary, product temperatures if temperature abuse is suspected.

NB Prior agreement should have been reached between the supplier and the cold room operator as to the method of further checking and the acceptance/rejection procedure to be followed if first samples fail to meet temperature requirements.

vi) Product temperatures should be checked against air temperatures under normal operating conditions and controls put in place so that actual air and product temperatures can subsequently be checked as appropriate.

vii) Operators should keep records of air temperature (for at least a year) for inspection by an enforcement

officer (or by the owner of the goods on request).

H. Caterers

i) Caterers as such do not sell quick-frozen foods as the food is sold in a chilled or heated form. **They are therefore not subject to the Quick-frozen Foodstuffs Regulations** and there are no specific legal requirements for temperature monitoring and control.

ii) Nevertheless, proper consideration must be given to the care of frozen foods as long as they are required to be stored.

iii) The temperature of a quick-frozen product on receipt at the caterer must, in any case, fulfil the requirements of the Regulations and it is recommended that caterers should operate similar control procedures as retail outlets (see above) both for the receipt and for the subsequent storage of frozen products.

SECTION 3

DUE DILIGENCE

i) All members of the supply chain will wish to provide themselves with an adequate defence of due diligence under the general provisions of the Food Safety Act 1990*. In this context, “The Food Safety Act 1990 — Guidelines on the Statutory Defence of Due Diligence”^{14*} (published in 1991 by the FDF, BRC, LACORS, IEHO and others) should be read and understood.

ii) In the Food Safety Act, the due diligence defence is as follows:

- The person charged must **“prove that he took all reasonable precautions and exercised all due diligence to avoid the commission of the offence”**.
- For traders who are neither manufacturers nor importers, a defence shall be deemed to have been established if they prove

EITHER:

a) in the case of a trader’s own branded goods:

- that the offence was due to an act or default of another person not under his control, or reliance on information supplied by such a person;
- that he carried out all such checks of the food in question

as were reasonable; or that it was reasonable for him to rely on checks carried out by the supplier; and

- that he did not know and had no reason to suspect that his act or omission would amount to an offence.

OR

b) in the case of a manufacturer’s branded goods:

- that the offence was due to an act or default of another person;
- that the sale was not under his name or mark; and
- that he did not know and could not reasonably have been expected to know that his act or omission would amount to an offence.

iii) Thus the Food Safety Act differentiates between goods sold under the name of the seller (i.e. retailers’ brands) and those sold under others’ brand names (i.e. manufacturers’ brands). In the former case, it will be necessary for a trader at least to establish that it was “... reasonable to rely on checks carried out by the person who supplied the food ...”. In the latter case, he need only establish that “... he could not reasonably have been expected to know ... that his act ... would amount to an offence”.

¹⁴ * For detailed reference see Appendix

iv) In the case of traders selling manufacturers' brands, the booklet "Guidelines on the Statutory Defence of Due Diligence" (above) recommends that:

- they should be able to show that they use reliable suppliers who have effective quality and quantity control procedures;
- that they require suppliers to provide written confirmation that food meets the quality required (a warranty).

v) Manufacturers may, accordingly, be expected by customers to provide such a warranty. In the case of quick-frozen foods, reference should be made to the Quick-frozen Foodstuffs Regulations. In the case of all frozen foods reference may be made to this booklet.

vi) Importers of quick-frozen food will need to establish that the product has been correctly treated and handled before coming into their care.

vii) Operators should ensure that staff carrying out temperature checks are properly trained to do so.

viii) It is recommended that operators establish with their Home Authority or Primary Authority the "normal working conditions" for refrigeration equipment testing and what might constitute "regular" or "frequent" monitoring in the circumstances that call for it.

ANNEX I

THE CONTROL PROCEDURE

A. General

i) Revised Code of Practice No 12 (COP) issued under the Food Safety Act covered the enforcement of temperature monitoring and measurement of “quick-frozen” foods, but this COP has now been superseded by the general Food Law Code of Practice (England) and the associated Practice Guidance^{15*}. There are parallel but separate publications for Scotland, Wales, and Northern Ireland. The enforcement procedures do not relate to frozen foods not marketed as “quick-frozen”.

ii) The Code of Practice / Practice Guidance states that “... enforcement should take place in a sequence of inspections and measurements and an authorised officer should only proceed to the next step if there is reasonable doubt that product complies with the Regulations”.

B. Air Temperatures

i) The initial stage of official inspection may include a discussion of the air temperature monitoring system, including the position of the sensors, how, under normal conditions, the air temperature relates to product temperature and how product temperature control is achieved.

ii) The authorised officer may check

the records and the accuracy of instrument readings and, in the case of distribution vehicles, that the equipment meets the official specification (see Annex II).

iii) Air temperatures may then be checked by the authorised officer.

iv) The enforcement action should cease at this stage if the officer is satisfied with the results of air temperature monitoring.

C. Non-Destructive Product Testing

i) If there is reasonable doubt about the air temperatures, the officer may be expected to proceed to a non-destructive, between-pack, product temperature measurement (see Annex V and the Code of Practice / Practice Guidance for details).

ii) A tolerance of 2°C should be allowed for the limitation of this methodology and 0.8°C as specified for instrument accuracy - a total of 2.8°C.

D. Destructive Product Testing

If the results of the non-destructive temperature measurement indicate that the product temperature is above the maximum (or if it is not possible to carry out a non-

^{15*} For detailed references see Appendix

destructive measurement) the officer can be expected to progress to a destructive test (See Annex V and the Code of Practice / Practice Guidance for details). A tolerance of 0.8°C should be allowed for instrument accuracy.

E. Sampling (See Annex IV)

The Code of Practice / Practice Guidance states: “It is essential to be able to identify the possible warmest positions where breach of the Regulations is most likely to occur.” With this objective, the Code of Practice / Practice Guidance lays down suggested sampling plans for the different stages of the cold chain. **If products sampled from these warmest points prove satisfactory, the result should give an adequate guarantee for the consignment as a whole.**

F. Dealing With Results

i) An unsatisfactory result from this procedure will indicate an offence in respect of individual packs at the warmest points of a consignment, but not necessarily in respect of other (by definition colder) packs within the load. Further action will depend upon the officer’s judgement as to whether there is doubt that any or all of the remaining packs are unsuitable for sale as quick-frozen foodstuffs.

ii) However, it is important to note that “such food does not necessarily fail food safety requirements and

may be still fit for consumption. In most cases action should not therefore be taken under Section 9 of the Food Safety Act 1990 [inspection and seizure of suspected food].

“The authorised officer should however advise the proprietor of the provisions of Section 14 of the Act [selling food not of the nature or substance or quality demanded] and discuss what action the proprietor proposes to take to deal with the quick-frozen foodstuff.”

ANNEX II

SPECIFICATIONS FOR TEMPERATURE MEASURING SYSTEMS

A. Air Temperature Measuring Systems

Commission Regulation (EC) No 37/2005 ('on the monitoring of temperatures in the means of transport, warehousing and storage of quick-frozen foodstuffs intended for human consumption') requires that the means of transport, warehousing and storage of quick-frozen foodstuffs shall be fitted with suitable recording instruments to monitor, at frequent and regular intervals, the air temperature to which the quick-frozen foodstuffs are subjected.

Since 1 January 2006, all measuring instruments used for the purpose of monitoring the (air) temperature must comply with three European Standards (below), and food operators are required to keep all relevant documents permitting verification that the instruments conform to the relevant EN standard.

- BS EN 12830:1999 Temperature recorders for the transport, storage and distribution of chilled, frozen, deep-frozen/quick-frozen food and ice cream. Tests, performance and suitability
- BS EN 13485:2001 Thermometers for measuring the air and product temperature for the transport,

storage and distribution of chilled, frozen, deep-frozen/quick-frozen food and ice cream. Tests, performance, suitability

- BS EN 13486:2002 Temperature recorders and thermometers for the transport, storage and distribution of chilled, frozen, deep-frozen/quick-frozen food and ice cream. Periodic verification

Companies do not need to obtain these documents directly but must ensure that their supplier has copies of them. It is not possible to adapt equipment to satisfy the standards. The equipment supplier must ensure that it complies.

There are certain exceptions to this general requirement:

- (i) The air temperature during storage in retail display cabinets, and in the course of local distribution, need only be measured by at least one easily visible thermometer.

In the case of open retail cabinets:
(a) the maximum load line of the cabinet shall be clearly marked;
(b) the thermometer shall indicate the temperature at the air return side at the level of that mark.

(ii) In the case of cold store facilities of less than 10m³ for storing stock in retail outlets, the air temperature need only be measured by an easily visible thermometer.

(iii) Measuring instruments installed before 31 December 2005 (in accordance with the legislation in force before the adoption of Regulation 37/2005) could continue to be used until 31 December 2009, but such equipment needed to be replaced before that date.

B. Product Temperature Measuring Systems

(NB These specifications are derived from the Food Law Code of Practice (England) and the associated Practice Guidance, but are not legally applicable to operators. However they will be used by enforcement authorities).

i) The response time should achieve 90% of the difference between the initial and final reading within three minutes.

ii) The system (comprising the instrumental read-out and the sensor) must have an accuracy of +/- 0.5°C within the measurement range -20°C to +30°C.

iii) The measuring accuracy must not change by more than 0.3°C during operation in the ambient

temperature range -20°C to +30°C.

iv) The display resolution for the system must be 0.1°C.

v) The accuracy of the system (read-out and probe) should be checked at regular intervals.

vi) The system should have a current certificate of calibration.

vii) The temperature probe should be capable of being easily cleaned.

viii) The sensor must be designed to ensure good thermal contact with the product.

ix) The electrical system should be protected against the undesirable effects of the condensation of moisture.

ANNEX III

TEMPERATURE MONITORING PROCEDURES

A. Cold Stores

i) The Quick-frozen Foodstuffs Regulations apply to stores in which the product is subject to the requirements of the Regulations. Many factory cold stores are used to stabilise the temperature of products, which have been frozen but are not yet at their final required temperature. Official control at factories should therefore be primarily concentrated on the outgoing products. However, some manufacturers use off-site cold storage facilities for the temperature stabilisation of product. Thus transport to these sites will be necessary prior to thermal stabilisation. **The temperature requirements of the Regulations do not apply until the product has been thermally stabilised.**

ii) Operators should be able to satisfy enforcement officers that the temperature monitoring sensors have been appropriately placed to measure the temperature in the chamber at the warmest positions and are giving accurate readings from appropriately calibrated instruments.

iii) Sensors should be located high up, well away from the evaporator fans and well away from entry and exit

doorways - to avoid exaggeratedly low temperatures on the one hand or sporadic temperature fluctuations on the other.

iv) The following table provides a guide to operators to assess the appropriate number of sensors necessary in different sizes of cold stores:

Chamber Volume (m ³)	No. of Sensors
less than 30,000	2 ^{16*}
30,000 - 60,000	4
over 60,000	6

It should be remembered that this is a guide only and the use of more temperature probes along with consideration of potential cold spots and air circulation may give a more accurate reading.

B. Distribution

i) Cooling units in distribution vehicles are designed only to maintain the temperature of a pre-cooled load. Measurement of the return air temperature to the cooling unit will give a good indication of the load temperature, provided adequate air flow is achieved throughout all parts of the vehicle chamber. If it

16 * Where product temperatures within a cold Store of less than 500m³ are shown to be stable then it may be appropriate to provide only one sensor. Back-up automatic or manual systems should be provided in such circumstances

is not, then the return air may be colder than the mean temperature. The differential between the air temperature of the return air to the cooler unit and the cold air to the load will be an indication of how well the refrigeration system is functioning. If the differential is large or variable it may be a sign of insufficient pre-cooling of the load, incorrect stowage, or unnecessary delay in closing the doors.

ii) More effective air temperature monitoring will be achieved by permanently fitting two sensors in the vehicle chamber. It's recommended, one should be located by the cooling unit to measure air return temperature, while the other should be positioned in the ceiling about two-thirds to three-quarters down the length of the chamber(Figure 1)

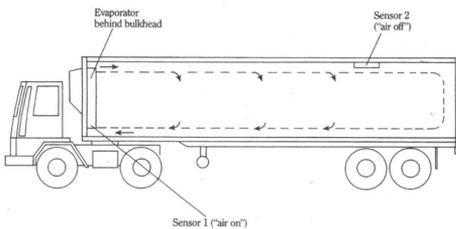


Figure 1: Location of Sensors in Vehicles

Multi-compartment vehicles will require separate monitoring of each compartment carrying food subject to the Regulations. If only one sensor is fitted then it should be sited to measure the air return temperature.

iii) International transport of quick-frozen foodstuffs is sometimes achieved by carrying the product in insulated containers which have to be connected to independent refrigeration machinery (clip-on units). Since this refrigeration equipment is not an integral part of the container, different systems may be used throughout the distribution cycle, eg, when the container is transferred from aboard a ship to road or rail transport.

Effectivetemperature monitoring may be accomplished by measurement of the temperature of the air returning to the machinery from the container. However, temperature monitoring records may not be immediately available for the whole of the journey and the recipient of the goods or the inspecting officer will have to make a judgement as to whether or not further inspection is necessary.

iv) The principle of using the temperature differential between the return air and the air supplied to the load cannot be applied in vehicles which are not fitted with forced air refrigeration (e.g. with liquid nitrogen cooling). In these instances, it will be necessary to take into account any likely vertical temperature gradients when positioning the sensors to ensure a representative air temperature measurement. If air circulation fans are not used then temperature measurements should

be taken from above and below the load.

v) Automatic temperature recorders must be fitted to primary distribution vehicles. These instruments should satisfy the legal requirements (see Annex II). Operators should be able to supply enforcement officers with evidence of the manufacturer's specification for any instrumentation being used.

vi) During transit, detailed examination of the load, other than checking of the air temperature monitoring record, will not be possible without suitable refrigerated facilities. It is therefore recommended that, where possible, checking takes place either at the beginning or the end of a journey.

C. Local Distribution

i) Because of the frequency of door openings in local delivery vehicles, air temperature measurements may not give a representative indication of product temperature and local distribution vehicles are not required to be fitted with temperature recording equipment. However, they are required to be fitted with a visible thermometer.

ii) It is recommended that sensors are located such that they indicate the temperature of the return air. Operators may increase the thermal load of the sensor, or use a product

simulant, to achieve a 'damped' response. This helps to smooth out the wide fluctuations in air temperature caused by the frequent opening of doors.

Designs of equipment for the measurement and monitoring of air temperatures will vary. The collection of the data from the measuring device can be completed using transfer via the earth wire of the electrical equipment or by transmitting and intercepting radio frequency air waves connected to a data logger or computer for example. Where such technologies are utilised care should be taken that the reliable transfer of accurate information is achieved consistently. Additionally, if fixed installations are not implemented verification of the probe identification / location periodically is recommended.

D. Retail Display Cabinets

i) Quick-frozen foodstuffs can be displayed at retail in a wide variety and style of cabinets but, in general, these can be divided into two groups: horizontal and vertical cabinets. While vertical cabinets tend to operate individually and by circulation of cold air, horizontal cabinets can be either individually or centrally operated. Cooling in horizontal cabinets is either by an air curtain across the top of the food, by contact with the base and side walls, or by a combination of these two methods.

ii) In cabinets that function by contact cooling or with a gravity air curtain, monitoring can take place by measuring air temperatures at the load line. In cabinets with forced air curtains, the differential between the air returning from the curtain to the intake of the evaporator (air-on), and the cold air leaving the evaporator (air-off) is an indication of the performance of the cabinet and operating conditions. Large or variable differentials could indicate operating practices such as loading product above the load line, not cooling product to the correct temperature prior to loading of the cabinet, or that the product is absorbing too much radiant heat from its surroundings. Regular monitoring of these two temperatures will enable anomalies in the cabinet's performance to be highlighted. Care should be exercised in the interpretation of such data and allowance made for equipment defrost cycles.

iii) The thermometer required by the Regulations for the monitoring of air temperatures must be easily visible to the authorised officer and operator, but this does not mean that it necessarily has to be visible to the consumer and it may include, for example, a read-out from a central control point that registers data from all the cabinets connected to the system. In the case of open cabinets, including open vertical cabinets, the thermometer has to be indicative

of the temperature at the clearly marked maximum load line. (NB In open vertical cabinets the load line is not usually marked as it is normally regarded to be the front edge of the shelves)

ANNEX IV

SAMPLING PROCEDURES

A. Cold Storage

Samples should be selected from several critical points in the cold store: for example, near the doors (upper and lower levels) and near to the air return of the cooling unit.

B. Transport

(i) *Inspection during transport:*

(NB It is expected that this will only be carried out in exceptional circumstances).

Samples should be selected from the top and the bottom of the consignment adjacent to the opening edge of each door or pair of doors.

(ii) *Inspection during unloading*

Four samples should be selected from amongst the following critical points:

- top and bottom of the consignment adjacent to the opening edge of doors;
- top rear corners of the consignment (at a point as far away from the refrigeration unit as possible);
- centre of the consignment;
- centre of the front surface of the consignment (as close as possible to the refrigeration unit);

- top and bottom corners of the front surface of the consignment (as close as possible to the return air inlet to the refrigeration unit).

(See Figs 2 and 3).

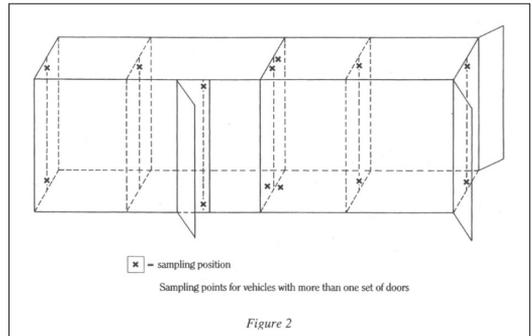


Figure 2

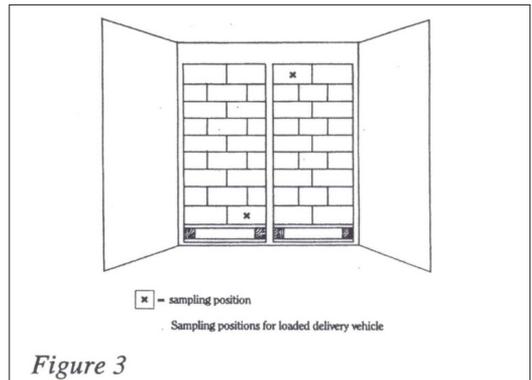


Figure 3

C. Retail Display Cabinets

A sample should be selected for testing from each of three locations representative of the warmest points as shown in the diagrams for the different types of retail display cabinet used. (See Figs. 4, 5, 6 and 7)

-  = possible sample point
-  = between-pack measuring point
- a - - b = load line

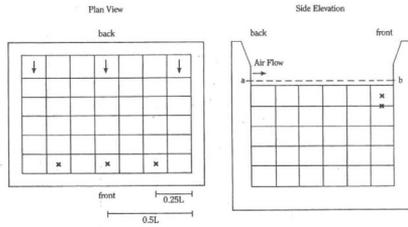
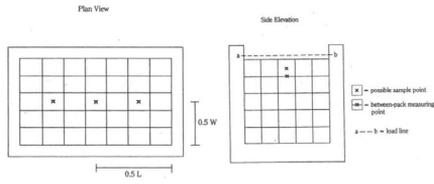


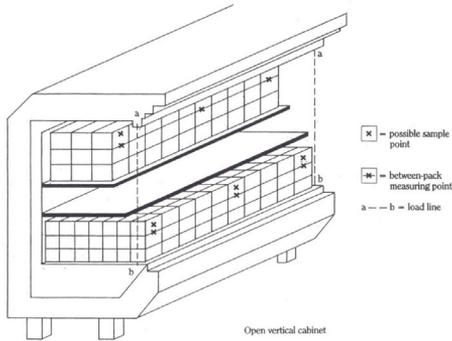
Figure: Horizontal cabinet — forced air circulation

Figure 4



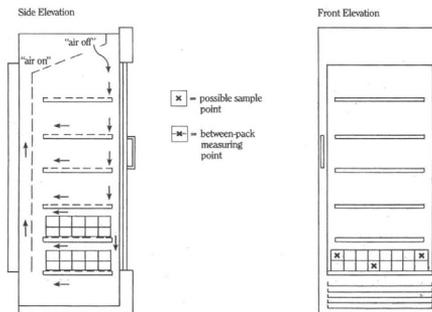
Horizontal cabinet — contact cooling

Figure 5



Open vertical cabinet

Figure 6



Vertical glass-fronted cabinet

Figure 7

ANNEX V

PRODUCT TEMPERATURE MEASUREMENT

A. Instruments

i) The temperature of samples taken should be measured accurately by means of appropriate instruments and recorded.

ii) Instruments should fulfil the following criteria:

- For penetrating the sample, a pointed metallic instrument such as an ice punch, a hand drill or an auger that is easy to clean.
- A thermometric measuring system should conform to the specification in Annex II and should be subject to regular checks for accuracy.

B. Non-destructive Product Testing

i) Before measuring the temperature of each sample the instrument for penetration of the foodstuff and the temperature probe of the thermometric measuring instrument should be cooled by a cooling method that ensures that their temperature is as close as possible to that of the sample in question.

ii) When performing a non-destructive between-pack temperature measurement it is important to ensure that good

thermal contact is achieved between the product and the probe. **A total tolerance of 2.8°C (0.8°C as specified for instrument accuracy, and 2°C for the limitations of the methodology) should be allowed.** Care should be taken to allow long enough for the reading to stabilise whilst ensuring that the temperature recorded is not that of the surrounding air rather than that which is indicative of the product, e.g. because the probe is not properly sandwiched between the packs. This testing must be conducted with the minimum of disturbance to the product or its temperature-controlled environment, particularly to the air flow patterns in retail display cabinets. For product within an outer casing it will be necessary to open the casing in order to insert the temperature probe between packs. If only between-case temperatures are taken, a suitable temperature tolerance will need to be allowed.

iii) Not all packs or packaging materials are suitable for this type of measurement. Irregularly shaped packs where good thermal contact is not possible, packaging materials that act as an insulator and products in cartons or bubble packs where large air spaces exist are all examples where a between-pack temperature measurement may not be sufficiently accurate to be indicative of the

product temperature. In such instances it may be necessary to proceed directly to a destructive temperature measurement.

iv) The operator or authorised officer conducting the test should ensure that all cases of quick-frozen foodstuffs opened for inspection are re-sealed and appropriately labelled or marked with the date and time of inspection, the name of the person who opened it and, where appropriate, the name of the food authority.

C. Destructive Product Testing

As far as it is practicable, sample preparation and temperature measurement should be undertaken whilst the sample remains in the refrigerated environment in which it was selected. If this is not possible the sample should be removed to an appropriately refrigerated environment provided the transfer does not prejudice its temperature. Any transfer should take place prior to preparation of the sample. Transfer of product within the normal cold chain, e.g. from a vehicle to a cold store, is acceptable.

D. Procedure For Measurement

(i) Pre-cooling of instruments

The temperature measuring probe and the product penetration

instrument should be pre-cooled before measuring the temperature of the product. The pre-cooling method used should ensure that both instruments equilibrate as closely to the product temperature as possible. Pre-cooling minimises any local rise in product temperature due to the action of making the hole and can usually be done by leaving the instruments and probe in the same temperature controlled environment as the sample for about 10-15 minutes. Provided there is no significant rise in the temperature of the instrument or probe, subsequent determinations can be made with a much shorter pre-cooling period.

(ii) Preparation of samples for temperature measurement

Only temperature measuring probes that are specifically designed for the purpose should be used to make a hole in the sample. In other cases a separate pre-cooled product penetration implement must be used. The diameter of the hole should provide a close fit to that of the probe, and its depth will depend on the type of product (as described in (iii)). It is important to ensure that any instrument used for making a hole in a quick-frozen foodstuff is maintained in a sharp condition, and can be easily cleaned.

(iii) Measurement of product temperature

The sample preparation and its temperature measurement should be undertaken whilst the sample remains in the selected refrigerated environment. Measurement should be as follows:

- Where the product dimensions allow, insert the pre-cooled probe to a depth of at least 2.5cm from the surface of the product.
- Where this is not possible the probe should be inserted to a minimum depth from the surface of at least 3 times the diameter of the probe. With some products, because of their small size, greater care has to be taken to avoid excessive rises in product temperature from unnecessary handling of the sample.
- Certain foods, because of their size or composition (e.g. green peas) cannot be drilled to determine their internal temperature. In these cases, the internal temperature of the food package should be determined by insertion of a suitable pre-cooled sharp-stemmed probe to the centre of the pack to measure the temperature in contact with the food.

The reading should be taken when the temperature indicated has reached a steady value.

- It may not always be possible to determine accurately the internal product temperature, for example with fragile or open-textured products such as meringue, bread or cakes. In such instances the operator or authorised officer should treat these products as for particulate foodstuffs (i.e. green peas, etc) and determine a surface product temperature by carefully removing product from its packaging and firmly sandwiching a pre-cooled flat-headed probe between two products.

ANNEX VI PRIMARY AUTHORITY ADVICE

The Guide to Storage and Handling of Frozen Foods provides both contextual information on the regulatory framework and Primary Authority advice specifically designed to ensure regulatory compliance. This is fully detailed below. Note: references to Regulations and Schedules are to The Quick-frozen Foodstuffs (England) Regulations 2007 except where otherwise specified.

INTRODUCTION	Informative	
SECTION 1 - GUIDE TO THE QUICK-FROZEN FOODSTUFFS REGULATIONS		
A. The Regulatory Structure	Informative	
B. Temperature Monitoring Systems	Informative	
SECTION 2 - RECOMMENDED PROCEDURES FOR THE COLD CHAIN		
A. Manufacturing	Compliance advice	Regulation 3 & Sch. 2. 1 (a) – (f) Regulation 4 Regulation 5 & FIC Articles 9, 24, 25 and Annex X Regulation 6
B. Primary Cold Stores	Compliance advice	Regulation 3 & Sch.2. 1 (e) & (f) Sch.1 and Regulation 37/2005 Article 2 Regulation 6 Regulation 8
C. Primary Distribution	Compliance advice	Regulation 3 & Sch.2. 1 (e) & (f) Sch.1 and Regulation 37/2005 Article 2 Regulation 6 Regulation 8
D. Secondary Cold Stores (Including RDC's)	Compliance advice	Regulation 3 & Sch.2. 1 (e) & (f) Sch.1 and Regulation 37/2005 Article 2 Regulation 6 Regulation 8
E. Local Distribution	Compliance advice	Regulation 3 & Sch.2. 1 (e) & (f) Sch.1 and Regulation 37/2005 Article 2 Regulation 6 Regulation 8

F. Retail Outlets	Compliance advice	Regulation 3 & Sch.2. 1 (e) & (f) Sch.1 and Regulation 37/2005 Articles 2 & 3 Regulation 6 Regulation 8
G. Cash and Carry Outlets	Compliance advice	Regulation 3 & Sch.2. 1 (e) & (f) Sch.1 and Regulation 37/2005 Articles 2 & 3 Regulation 6 Regulation 8
H. Caterers	Best practice advice	
Section 3 - DUE DILIGENCE	Compliance advice	Food Safety Act, s.21
Annex I - The Control Procedure	Informative	
Annex II - Specifications for Temperature Measuring Systems	Compliance advice	Regulation 6 Sch.1 and Regulation 37/2005 Articles 2 & 3
Annex III - Temperature Monitoring Procedures	Compliance advice	Regulation 6 Sch.1 and Regulation 37/2005 Articles 2 & 3 Regulation 8
Annex IV - Sampling Procedures	Informative	
Annex V - Product Temperature Measurement	Informative	
APPENDIX - References and Other Relevant Texts	Informative	

APPENDIX REFERENCES

1. The Quick-frozen Foodstuffs Regulations 1990 (Statutory Instrument 1990 No 2615) [revoked in respect of England, Wales, Northern Ireland]
2. The Quick-frozen Foodstuffs (Amendment) Regulations 1994 (SI 1994 No 298) [revoked in respect of England, Wales, Northern Ireland]
3. The Quick-frozen Foodstuffs (England) Regulations 2007 (SI 2007 No 191) and Explanatory Memorandum
4. The Quick-frozen Foodstuffs (Wales) Regulations 2007 (SI 2007 No 389, W.40)
5. The Quick-Frozen Foodstuffs (No 2) Regulations (Northern Ireland) 2007 (SR 2007 No 110)
6. The Quick-frozen Foodstuffs Amendment (Scotland) Regulations 2007 (SSI 2007 No 106) and Executive Note
7. Council Directive (89/108/EEC) of 21 December 1988 on the approximation of the laws of the Member States relating to quick-frozen foodstuffs for human consumption (Official Journal L40, 11/02/1989, p.34)
8. Commission Directive (92/1/EEC) of 13 January 1992 on the monitoring of temperatures in the means of transport, warehousing and storage of quick-frozen foodstuffs intended for human consumption (Official Journal L34, 11/02/1992, p28) [repealed by Regulation (EC) 37/2005; reference 7 below]
9. Commission Directive (92/2/EEC) of 13 January 1992 laying down the sampling procedure and the Community method of analysis for the official control of the temperatures of quick-frozen foods intended for human consumption (Official Journal L34, 11/02/1992, p30)
10. Commission Regulation (EC) No 37/2005 of 12 January 2005 on the monitoring of temperatures in the means of transport, warehousing and storage of quick-frozen foodstuffs intended for human consumption (Official Journal L10, 13/01/2005, p18)
11. The Food Safety Act 1990: Revised Code of Practice No 12 "Quick-frozen Foodstuffs - Division of Enforcement Responsibilities, Enforcement

of Temperature Monitoring and Temperature Measurement” – superseded by Codes of Practice (and associated Practice Guidance) as below. Note: The current England (2017) and NI (2016) codes do not specifically deal with enforcement of temperature motoring for the purposes of QFF.

12. Food Law Code of Practice (England), March 2017, and associated Practice Guidance (England), 2017.
13. Food Law Code of Practice (Scotland) 2015, and associated Practice Guidance (Scotland) 2015 (see Chapter 3.7, in Code of Practice)
14. Food Law Code of Practice (Wales), April 2014, and associated Practice Guidance (Wales), November 2012 (see Chapter 3.7, in Code of Practice)
15. Food Law Code of Practice (Northern Ireland), February 2016, and associated Practice Guidance (Northern Ireland), October 2016.
16. For details of other food law legislation, see the Food Standard Agency’s Food and Feed Law Guide
17. BS EN 12830:1999 Temperature recorders for the transport, storage and distribution of chilled, frozen, deep-frozen/quick-frozen food and ice cream. Tests, performance and suitability (Available from <http://shop.bsigroup.com/>)
18. BS EN 13485:2001 Thermometers for measuring the air and product temperature for the transport, storage and distribution of chilled, frozen, deep-frozen/quick-frozen food and ice cream. Tests, performance, suitability (Available from <http://shop.bsigroup.com/>)
19. BS EN 13486:2002 Temperature recorders and thermometers for the transport, storage and distribution of chilled, frozen, deep-frozen/quick-frozen food and ice cream. Periodic verification (Available from <http://shop.bsigroup.com/>)
20. Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be used for such Carriage (ATP), as amended on 2 January 2011

See also: Guide to ATP for Road Hauliers and Manufacturers (September 2010 - Refrigerated Vehicle Test Centre, Cambridge Refrigeration Technology Limited)

21. Food Safety Act 1990: Guidelines on the Statutory Defence of Due Diligence (February 1991, LACOTS (later LACORS) et al)
22. Into The Light – A Guide to Good Practice (Guidance notes for outer case labelling of manufacturers’ branded frozen products in the foodservice supply chain, published by the British Frozen Food Federation, 2002, revised 2016)
5. Guide to refrigerated transport (International Institute of Refrigeration, 2010; ISBN 9782913149786)
6. International Institute of Refrigeration Summary concerning the ATP agreement

Other Relevant Texts

1. Recommended International Code of Practice for the Processing and Handling of Quick Frozen Foods (Codex ref CAC/RCP 8-1976, revised 2008)
2. Food Standards Agency Factsheet: Quick Frozen Foodstuffs Regulations 2007
3. Recommendations for the Processing and Handling of Frozen Foods (International Institute of Refrigeration, 2006; ISBN 9782913149526)
4. Control of the Cold Chain for Quick-Frozen Foods Handbook (International Institute of Refrigeration, 1999; ISBN 2913149014)

MEMBERS OF THE 1994 EDITORIAL COMMITTEE

Mrs L. Allan - IEHO

W.J. Bittles - CSDF

B. Bruce - Salvesen Food Services Ltd

M. DuVal - LACOTS

M. Greenfield - Brake Bros. Foodservice Ltd

K. Hargin - MAFF

G. Molloy - UKAFFP

C.R. Morrison - Ross Young's Ltd

R. M.Wadsworth - Iceland Frozen Foods pl



British Frozen Food Federation
Warwick House, Unit 7, Long Bennington Business Park,
Main Road, Long Bennington, Newark, Nottinghamshire NG23 5JR
Tel: 01400 283090
Fax: 01400 283098
www.bfff.co.uk