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ECONOMIC COMMISSION FOR EUROPE  
COMMITTEE ON AGRICULTURAL PROBLEMS

ALINORM 74/25

Working Party on Standardization of Perishable Foodstuffs

JOINT FAO/WHO FOOD STANDARDS PROGRAMME  
CODEX ALIMENTARIUS COMMISSION

Tenth Session  
Geneva, July 1974

REPORT OF THE EIGHTH SESSION OF THE JOINT ECE/CODEX ALIMENTARIUS  
GROUP OF EXPERTS ON THE STANDARDIZATION OF QUICK FROZEN FOODS

Geneva, 30 April - 4 May 1973

Introduction

1. The Joint ECE/Codex Alimentarius Group of Experts on Standardization of Quick Frozen Foods held its eighth session at the Palais des Nations, Geneva, from 30 April to 4 May 1973.
2. The Group of Experts unanimously elected Mr. T. van Hiele (Netherlands) as Chairman of the session. Mr. W. Orłowski (Poland) was unanimously re-elected as Vice-Chairman.
3. Representatives from 26 countries were present: Algeria, Argentina, Australia, Austria, Belgium, Brazil, Canada, Denmark, Finland, France, F.R. of Germany, Hungary, Italy, Japan, Netherlands, Norway, Philippines (observer), Poland, Portugal, Romania, South Africa (observer), Spain, Sweden, Switzerland, United Kingdom and United States of America. Observers from the Association européenne des exploitations frigorifiques (AEEF), the Association of Official Analytical Chemists (AOAC) and the European Economic Communities (EEC) were also present. The list of participants is contained in Appendix I to this Report.

Election of Rapporteur

4. Mr. F. Dunn (USA) agreed to act as Rapporteur and was so appointed by the Group of Experts.

Adoption of Agenda

5. The Group of Experts unanimously adopted the provisional agenda for the session.

Matters arising from Reports of other Codex Sessions

6. The Group of Experts agreed that it would consider any matters arising from Reports of other Codex sessions, when it came to discuss the standards individually.

#### Consideration of General Comments of the USA regarding Format for Quality Criteria (Defects) and Lot Acceptance applicable to all Standards

7. The Group of Experts considered the US proposals referred to above which were set out in document CX/QFF 73/5 (AGRI/WP.1/GE.3/R.3). The Group agreed with the proposal to sub-divide the sub-section on General Requirements in the section Quality Factors into two categories namely those requirements for which no tolerances would be allowed and those requirements for which tolerances would be allowed.

8. The Group also accepted the US proposal that, for the purposes of tolerances, a distinction should be made between minor defects, major defects and serious defects. The proposal of the USA that compliance with the tolerances should be based on a standard sample unit of fixed size rather than a sample unit arrived at on the basis of a multiplication factor, which as a practice would be statistically unsound, was also accepted. For example it would be statistically incorrect to take, instead of a sample of 300 grammes, a sample of 150 grammes and to multiply the number of defects by 2.

9. Having accepted the above-mentioned principles, the Group agreed to apply them to the draft standards to be considered. The Group recognized, however, that in adopting this procedure it might not be possible to advance the Step 7 standards to Step 8. It was agreed that a decision on this would be taken after having considered the Step 7 standards in the light of government comments submitted for the session.

10. The delegation of Japan informed the Group that, as regards Tolerances for Visual Defects and Definition of "Defective", it had its own proposed amendments to all the draft standards which were to be considered by the Group at this session, but it agreed to join the majority of the Group who were willing to proceed in accordance with the US proposed format. The delegation of Japan stated that it reserved its position, since the US proposition needed further careful study by the Japanese experts.

#### Consideration at Step 7 of Draft Standard for Quick Frozen Raspberries Process Definition

11. The Group decided that it would be appropriate to consider the process definition after it had reviewed the Draft Code of Practice for the Processing and Handling of Quick Frozen Foods.

#### Essential Composition and Quality Factors Optional Ingredients

12. It was agreed to provide for invert sugar syrup.

#### Definition of Defects

13. It was agreed that this heading should read "Definition of Defects for Composition". The Group noted that sub-sections 3.1.1 and 3.1.2 referred to in the Definition, should read sub-sections 3.2.1 and 3.2.2.

#### Lot Acceptance and Composition

14. The Group agreed to delete the reference to 1969 in the title of the Sampling Plans for Prepackaged Foods and to give the correct reference as shown in the Recommended Standard for Quick Frozen Strawberries.

#### General Requirements

15. The Group agreed on a re-presentation of the general requirements in accordance with its earlier general decision on this subject. The French delegation indicated that the provision "of similar varietal characteristics in each package" should be "de caractéristiques variétales similaires dans chaque emballage".

#### Analytical Characteristics

16. The Group took note of the contents of paragraph 53 of the Report of the Sixth Session of the Methods of Analysis and Sampling Committee concerning the determination of mineral impurities such as sand in quick frozen strawberries, quick frozen peaches and quick frozen bilberries and of paragraph 72 of the Report of the Sixth Session of that Committee dealing with the reconsideration by that Committee of methodology for the determination of mineral impurities in canned strawberries and quick frozen strawberries. The Group considered the question of whether the method for the determination of mineral impurities should be on the basis of insolubility in hydrochloric acid or on the basis of insolubility in water. The Group agreed that if, for the purposes of the standard, mineral impurities was to mean sand, a method based on insolubility in hydrochloric acid would be the most appropriate. Since, however, the Group wished to cover other inorganic material, such as particles of limestone in addition to sand, the Group agreed that it would be necessary to base the method on insolubility of the material in water. The Group agreed that, in principle, one method for the determination of mineral impurities should be adopted for all quick frozen fruit and vegetables, whilst at the same time recognizing that there might be a need for minor variations in the method depending on the product concerned. After some discussion, the Group agreed to retain the limit of 0.05 per cent m/m for mineral impurities, to include sand and other inorganic earthy material, based on the method set out in Appendix II to this Report.

#### Definition of Visual Defects

17. The Group agreed to adopt the definitions of "partially uncoloured" and "completely uncoloured" berries given in the Recommended Standard for Quick Frozen Strawberries. It was also noted that "pulpy mess" should read "pulpy mass" in the definition of "disintegrated or not intact" berries.

#### Tolerances for Visual Defects

18. The Group proceeded in accordance with the proposals of the delegation of the USA and agreed on a standard sample unit of 300 grammes. The Group adopted the Table of Defects set out in the US written comments, but deleted reference to "decay" for which there would be no tolerance, since a tolerance for decay would be in conflict with the no-tolerance section of the general requirements (clean and sound), and, also increased the tolerance for major defects from 8 to 10 points, and the total tolerance from 15 to 20 points. As regards "dissimilar varieties" it was noted that the definition of this type of defect did not permit the mixing of red and black raspberries.

#### Drained Berry Ingredient

19. The Group agreed that this sub-section was more appropriate to the section on methods of Analysis and Sampling.

#### Definition of "Defective" for Quality Criteria

20. The Group agreed that free flowing should be treated as a separate category for lot acceptance, and also deleted sub-section 3.3.6(c)(iii) and (iv) since they were covered in the new table setting out tolerances for defects.

## Hygiene

21. It was agreed that the section on hygiene should be editorially amended to bring it into line with the text on hygiene adopted for the Recommended Standard for Quick Frozen Strawberries. The Group agreed to seek the guidance of the Codex Committee on Food Hygiene as to how best the problem of infestation (larvae, insects, etc.) could be dealt with in Codex standards which do not make specific provisions for tolerances for such defects.

## Labelling

22. The delegation of the Federal Republic of Germany expressed the view that the section dealing with the declaration of net contents should contain a provision requiring the declaration by weight of added sugar. The Group did not think it was necessary to include such a provision in the standard at the present time, and felt that the matter could be dealt with separately by the governments.

## Consideration at Step 7 of the Draft Standard for Quick Frozen Spinach Style

23. The Group decided to adopt the proposal of the USA for a slight modification of the definition of style as contained in document CX/QFF 73/4 (AGRI/WP.1/GE.3/R.1), and amended the standard in section 2.3.1 accordingly. The Group agreed to substitute in the French text the words "épinards hachés fins" for "purée d'épinards" in this section.

## General Requirements

24. The Group decided to sub-divide the sub-section on General Requirements in the section Quality Factors into two categories, as it had done for Quick Frozen Raspberries, namely those for which no tolerances would be allowed and those requirements for which tolerances would be allowed.

## Analytical Characteristics

25. The Group agreed to delete the specific reference to sand in the sub-section Mineral Impurities, as the Group wished to cover other inorganic material. The Group also decided to adopt the proposal of the Netherlands on total dry matter and free water as contained in document CX/QFF 73/4 (AGRI/WP.1/GE.3/R.1), with appropriate re drafting to emphasize the two possibilities for acceptance based on total dry matter (excluding added salt), or on free water content. The Group agreed that if, after having completed its consideration of the standard, it should decide to advance the standard to step 8, the figures for total dry matter (excluding added salt) (5.5% m/m), and free water content (35% m/m) should be footnoted to indicate that they were not final and were subject to reviews.

## Definition of Visual Defects

26. In this section the Group decided to delete references to both fibrous material and pierced leaves, which were, in any event, covered in the General Requirements. The Group agreed to retain the other definitions, with editorial corrections where necessary for clarification purposes, and with the addition of a new definition for "flower buds" which would read "The separate flower buds detached from the flower heads".

## Tolerances for Visual Defects

27. The Group agreed to a standard sample unit size of 300 grammes for spinach in the styles "Whole and Leaf" and "Cut Leaf" and a size of 100 grammes for the styles "Chopped" and "Pureed". The Group agreed on three defect tables covering (i) Whole

Leaf and Cut Leaf (ii) Chopped Style and (iii) Puree Style. The tolerances agreed upon can be seen in the revised version of the standard.

#### Lot Acceptance for Quality Criteria

28. The Group agreed to consider the Analytical Characteristics separately from Visual Defects for the purposes of Lot Acceptance.

#### Labelling

29. The Delegations of the Federal Republic of Germany and France suggested that when salt was added, its presence should be declared in close proximity to the name. The majority of the Group were satisfied that it was sufficient to indicate the presence of salt in the list of ingredients.

#### Additional Requirements (Labelling)

30. The Group considered whether it was appropriate to require cooking instructions to be given on the label. As this was the general trade practice, the Group agreed to retain the provision. The delegation of the Federal Republic of Germany considered it was necessary that cautionary advice should be a mandatory requirement on the label recommending that once cooked the product should not be re-heated, because of its use in baby foods and of the possibility of the formation of nitrites. The delegation of the USA informed the Group that extensive studies had been conducted recently in the USA, which would not support the view regarding the conversion of nitrates to nitrites. The delegation of the USA further indicated that this information would be submitted to the Codex Committee on Foods for Special Dietary Uses in connexion with that Committee's work on standards for canned baby foods. In the light of this information the Group decided to make no change in the standard.

#### Methods of Analysis and Sampling in the Draft Standards for Quick Frozen Raspberries and Quick Frozen Spinach

31. The Group agreed with the provisions set out in the revised versions of the draft standards.

#### Process Definition in the Draft Standards for Quick Frozen Raspberries and Quick Frozen Spinach

32. In the light of the Group's discussion on the Code of Practice for the Processing and Handling of Quick Frozen Foods and the Procedure for Checking Temperatures of Quick Frozen Foods, (see paras 34 to 51) the Group agreed that it would not be feasible to make any change in the Process Definition at this time other than to delete the words "followed by the re-application of the quick-freezing process as defined". The Group agreed to retain the existing text as amended therefore, noting that, apart from the deletion referred to above, it already appeared in other standards for quick frozen fruits and vegetables adopted by the Commission.

#### Status of Draft Standards for Quick Frozen Raspberries and Quick Frozen Spinach

33. The Group agreed to advance the Draft Standard for Quick Frozen Raspberries (Appendix III to this Report) to Step 8 of the Procedure. The Group agreed to return the Draft Standard for Quick Frozen Spinach (Appendix IV to this Report) to Step 6 for a further round of Government comments on the Draft Standard with particular reference to salt-free dry matter, drained weight and tolerances for visual defects.

#### Consideration at Step 7 of the Draft Code of Practice for the Processing and Handling of Quick Frozen Foods'

### Section I - Scope and Purpose

34. The Group agreed to add the words "and handling" after the word "production" in sub-section 1,3.

### Section II - Raw Material and Preparation

35. The Group discussed the temperature range (+10°C to +60°C) in sub-section 2.3, within which pre-cooked foods intended for quick-freezing should not be held, in order to minimize micro-biological activity. Several delegations were in favour of extending the range (critical zone), by lowering the lower limit from 10°C to 8°C or, as some delegations wanted, to 5°C. It was pointed out that it would be desirable to have a lower figure than 10°C, since some small quick-freezing plants might find it necessary to hold the product intended for quick-freezing for a longer period than larger plants and, in such circumstances, it was desirable that the product be held at a lower temperature than 10°C. As against this, it was pointed out that a figure lower than 10°C would present difficulties from the point of view of working conditions for operatives in the plant. It was agreed that if the product was not held for long at 10°C there should be no problem. Thus in sub-section 2.3, it was recommended that pre-cooked foods intended for quick-freezing should be cooled as rapidly as possible. The Group finally agreed to leave sub-section 2.3 unchanged.

### Section III - Quick Freezing

36. Attention was drawn to two typographical errors in sub-section 3.2. The text in brackets should read "(for most products -1°C to -5°C)" and "(+30°F to +23°F)". It was agreed to amend sub-section 3.4 in accordance with the written proposals of the delegation of the Netherlands. Sub-section 3.5 was deleted, since the substance of it was covered in Section V. In the case of sub-section 3.6, the written proposal of the Netherlands was adopted. In sub-section 3.7 after the opening sentence "The recognized practice of repacking quick-frozen products", the words "followed by the re-application of the quick-freezing process" were deleted. This was done because these words might be taken to mean that after repacking the product would again have to go through the quick-freezing cycle, which would not always be technically possible once the product had been packaged.

### Section V - Transport and Distribution

37. The Group agreed to adopt the written proposed amended version of sub-section 5.1 submitted by the delegation of the Netherlands, as amended during the session, and which drew a distinction between long distance and local distribution. Sub-section 5.4 was amended in accordance with the substance of the written proposal of the Netherlands. There was some discussion on the practicability of recording the temperature of the product on a routine basis; the Group considered that the text it had adopted took into account future developments.

38. As regards sub-section 5.4, the Group decided to adopt the written proposal of the Netherlands. In adopting this, the Group recognized that, at the moment, there was no practicable routine method for checking the temperature of the product from outside the transport vehicle. The Group agreed to add three further sub-sections (5.5, 5.6 and 5.7), as proposed in their written comments by the Netherlands and as amended during the course of the session. As regards sub-section 5.6 relating to the transportation of quick-frozen foods for local distribution, the proposal that the temperature at which the product is delivered should not exceed -12°C was the subject of considerable discussion. Several delegations were opposed to a figure as high as -12°C, on the

grounds that it would not then be possible to make the product available to the consumer at -18°C, which was the recommended temperature at which the product should be made available to the consumer, since retail cabinets were designed generally to maintain temperature and not to lower it in the period of time in which the product would normally be in the retail cabinet. Other delegations supported the Netherlands proposal of -12°C and pointed out that there would be no quality deterioration in the product at this temperature in the relatively short period of time it would normally be kept in the retail cabinet. Two delegations stated that they could not agree to a temperature higher than -15°C. The Group agreed that it was not in a position at this stage to fix a figure in this sub-section of the Code, and decided to express this provision in general terms, pending the receipt from governments of data based on experience in their countries. It was agreed to include a footnote in the Code to this effect. As regards sub-section 5.7 dealing with a temperature rise of the product during local transport, the Group agreed to add a provision recommending that where a temperature rise occurred and where it was not possible to reduce the temperature soon after delivery to -18°C, the product should be sold as soon as possible.

#### Section VI - Retail Sale

39. In considering sub-section 6.3 dealing with short period temperature rises in retail cabinets, the Group agreed to delete the phrase "under the circumstances described in sub-section 6.4", since it might give rise to misunderstanding when read in conjunction with that sub-section. The Group agreed that this sub-section, which provided that the temperature of the product should not be allowed to become higher than -15°C, should be footnoted in the same sort of terms, as was agreed upon in the case of sub-section 5.6. The delegations of the Federal Republic of Germany, Japan and Switzerland, indicated that they would be opposed to any temperature figure in sub-section 6.3 higher than -15°C.

40. Concerning sub-section 6.4, the Group agreed that the first section was redundant. The Group agreed to add to the remainder of this sub-section a written proposal of Norway requiring that cabinets should be covered at night and over the week-end and that defrosting should be carried out outside the normal shopping hours.

41. The delegation of France emphasized the importance of the Norwegian proposal since often not enough attention was paid to (i) the best location in shops of retail cabinets, (ii) the need for covering cabinets during the night-time and during week-ends and (iii) the measures which should be taken regarding defrosting. The delegation of France added that these matters should be covered in the Code, since they would be very useful to the quality control services and would result in the consumer receiving a better product.

42. The Group agreed to delete sub-section 6.6. It was agreed to amend sub-section 6.7 to read "Unpacked products are subject to risk of contamination and dehydration and should be stored and displayed in compartments separate from those used for packaged quick-frozen foods".

#### Section VII - Packaging

43. The Group agreed to add a new sub-section (7.2) as follows: "Retail packages should be preserved intact up to the time of final sale".

#### Section VIII - Hygiene

44. The Group agreed to make a slight alteration in sub-section 8.2 to make it clear that, in addition to the recommendation that quick-frozen foods should comply with the provisions of the General Principles of Food Hygiene, they should also, where appropriate, comply with any relevant Codes of Hygiene Practice.

#### Status of the Code of Practice for the Processing and Handling of Quick Frozen Foods

45. The Group agreed to advance the above mentioned Code (Appendix V to this Report) to Step 8 of the Procedure.

#### Consideration at Step 4 of the Procedure for Checking Temperature of Quick Frozen Foods

46. In the light of an explanation given by the delegation of the United States of America about the development of the working document CX/QFF 73/2 (AGRI/WP.1/GE.3/1) Appendix I, the Group decided to amend the draft Procedure on the basis of the written proposals made by the Netherlands contained in document CX/QFF 73/6 (AGRI/WP.1/GE.3/R.4) and to discuss only the points of major concern in the Procedure.

#### Scope

47. The Group decided to redraft the proposals of the Netherlands on this section to emphasize the three possibilities for measuring product temperature and to indicate the relevant sections in the Procedure where these temperature measuring methods were to be found.

#### Definitions

48. Following a discussion on taking product temperature 2½ cm below the surface, the Group noted the difficulties involved in temperature measurement of products of different shape, and decided to ask governments to supply information on this problem on the basis of practical experience. In particular, Governments were requested to comment on the figure of 2.5 cm which seemed inadequate for large bulk packs especially of free-flowing products, and also to consider the question of whether it would be appropriate to take the temperature at a mid point in the case of unusually shaped packs. The Group noted the diagram illustrating the method of measuring product temperature and decided to correct the illustration.

#### Sampling

49. The Group discussed methods of selecting packages from retail cabinets for temperature checking, and referred to Draft ISO Recommendation No. 2335 (ISO/TC 86/103) (Commercial Refrigeration Cabinets - Methods of Test - Part II Temperature Test). The Group agreed that this method was not appropriate as a practical inspection procedure. The Group agreed that the chosen method would have to be practical and routine to operate, but was unable to agree on a suitable sampling procedure and decided to leave in the text in document CX/QFF 73/2 (AGRI/WP.1/GE.3/1) Appendix I the methods proposed by the Federal Republic of Germany and the United Kingdom and to reconsider the draft at a later stage in the light of government comments on the revised text.

50. The amended Procedure for Checking Temperature of Quick Frozen Foods, is set out in Appendix VII to this Report, and will be reconsidered at Step 4 by the Group at its next session in the light of government comments (see also paragraph 65 of this Report).

51. The diagrams shown in Appendix VIII to this Report, which the Group agreed to include therein, are taken from the Draft ISO Recommendation No. 2335 of ISO/TC 86 (Secr - 90) 103. An M package as referred to in the diagrams is defined as a test package with temperature sensor.

#### Consideration at Step 7 of the Draft Standard for Quick Frozen Peaches

52. The Group had for consideration the Draft Standard as outlined in Appendix IV of ALINORM 71/25 (AGRI/334; AGRI/WP.1/677) and written comments from Governments contained in document CX/OFF 71/5 (AGRI/WP.1/709). The Group decided that for this standard it would follow the same format for Quick Frozen Peaches as it had for quick Frozen Rasp berries and Spinach.

#### Scope

53. Attention was drawn to the botanical name used in this section, and it was agreed that the Secretariat should check that this name was the appropriate one.

#### Product Definition

54. The Group agreed to delete the words "of firm texture" from the second line of this sub-section. It agreed that texture should be handled under Quality Factors and decided to bring the text of this section into line with the text in the standards for Quick Frozen Raspberries and Spinach.

#### Presentation

55. The Group decided to accept the written proposal of Austria and to add a paragraph (d) to cover green peaches, as had been done in the Recommended Standard for Canned Peaches. Also in sub-section 2.3.1 Colour Type, the word "may" in the first line would be deleted and the word "shall" substituted therefor. (See paragraph below).

#### Style

56. In discussing the written proposals of France, the Group decided that the wording for paragraph (b) "Halves" should read "pitted and cut along the longitudinal axis into two approximately equal parts" and that the words "along the longitudinal axis" should be appropriately inserted in paragraphs (c) and (d). The Group also decided to adopt the written proposal of the United States of America to include in (f) that the maximum size of a cube in diced style should be 15 mm on one edge. Several delegations sought a clarification of the meaning of the word "may" in the sentence "Quick frozen peaches may be presented in the following styles", as in other standards the word "shall" had been employed. This led to a discussion of the intent of the standard in question and of the purpose of standardization in general. Some delegations thought that the use of the word "shall" made the provisions in styles mandatory in the sense that the product Quick Frozen Peaches could be presented only in the styles mentioned. The suggestion was therefore put forward that an additional provision be included under the heading style providing for other styles not specified, e.g. "Others". The Group considered, however, that this was not feasible as it would run counter to the purpose of international standardization which was to define all the styles of production of the product entering international trade under the name prescribed for the product in the standard. The Group agreed that if styles other than those listed in the standard were to be developed, then it would be open to the Group to consider the revision or amendment of the standard. The Group accepted the view that whether the word "shall" or "may" was used or even if there was no introductory provision to the style section, the intent of the standard would

be the same. The Group, therefore, agreed for the sake of consistency to use the word "shall".

#### Essential Composition

57. In the sub-section Optional Ingredients the Group decided to provide for invert sugar syrup, and to bring the wording of this sub-section into line with the previous standards studied. In the sub-section Composition, the Group agreed to insert the words "expressed as sucrose" after the figure "18%" and in the sub-section "Peaches Prepared in Syrup" it was agreed to substitute "30%" for "25%" in the second last line. The Group decided to insert two new paragraphs in this sub-section namely 3.2.3 "Definition of 'Defective' for Composition", and 3.2.4 "Lot Acceptance for Composition" in which the wording would follow that for the standard for Quick Frozen Raspberries.

#### Quality Factors

58. The Group agreed that this section should be redrafted and developed along the lines of the standards for Quick Frozen Raspberries and Spinach, and that this work would be undertaken by the United States of America, taking into account the written comments of governments. The revised text would be submitted as a working document for the next session.

#### Food Additives

59. Some delegations were opposed to the use of sodium alginate in frozen peaches, as they saw no technological need for this substance and it might make the product appear better than its original quality suggested. The delegate of the United States of America explained that alginates are commonly used in his country in a number of products as a stabilizer. In the case of frozen peaches, especially in large containers, the use of sodium alginate would thicken the syrup and would help assure a more uniform dispersion of peaches in the syrup; at the same time it would aid in the preservation of the colour of the product, since it would tend to keep the peaches coated with syrup. The Group agreed to retain sodium alginate in the draft standard, but to place the reference in square brackets. Finally, the Group agreed to include pectin in the list of additives for use as a stabilizing agent, and without limitation.

#### Status of the Standard for Quick Frozen Peaches

60. The Group decided to return the Standard to Step 6 to be redrafted in part and to be sent for a further round of Government comments.

#### Consideration at Step 7 of the Draft Standard for Quick Frozen Bilberries

61. The Group had before it the Draft Standard as contained in document ALINORM 71/25 Appendix V (AGRI/334; AGRI/WP.1/677), and the written comments from governments on the standard in document CX/QFF 71/5 (AGRI/WP.1/709). The Group decided not to discuss the Draft Standard in detail as parts of the standard would have to be re drafted to bring the provisions into line with those for the standard for Quick Frozen Raspberries. Matters of particular interest to the rapporteur were discussed and the Group decided to incorporate the following provisions in the revised draft: to provide a tolerance for mineral impurities of 0.05% m/m; to increase the refractive Brix value from 25% to 30%; to provide a tolerance of 1 % m/m for berries visibly attacked by diseases; to establish a standard sample size of 300 grammes and to provide a tolerance for leaves and similar extraneous vegetable material at 4 pieces/300 grammes.

62. The Group decided to return the Standard for Quick Frozen Bilberries to Step 6 for redrafting and a further round of comments from Governments.

#### Direct Contact Refrigerants

63. The Group had before it a report submitted by the delegation of the United Kingdom on the use of liquid freezants in food. The freezants covered by the report were liquid nitrogen, liquid carbon dioxide and dichlorodifluoromethane. The report indicated two technological advantages of the freezants and gave an evaluation of their safety in use in food. The delegation of the United Kingdom informed the Group that their authorities were expecting to consider applications in the near future for the use of those freezants for specific foods. The Group noted in the cases of liquid nitrogen and liquid carbon dioxide that these were in general use in many countries. Concerning the use of dichlorodifluoromethane there appeared to be a steadily increasing number of countries prepared to permit the use of this freezant. The delegation of the United States of America stated that it had general approval by the Food and Drug Administration for use subject to a minimum purity requirement of 99.97% and good manufacturing practice. The delegations of Sweden and France stated that dichlorodifluoromethane had provisional approval in their countries, subject to a minimum purity requirement of 99.97% and a residue level of not more than 100 mg/kg after thawing. The Group further noted that long term feeding studies were in hand which would be made available for the complete toxicological evaluation of dichlorodifluoromethane. The Group requested that the data on the three freezants be submitted to the next session of the Codex Committee on Food Additives. It was hoped that full documentation would be available by that time to enable the Codex Committee on Food Additives to refer the freezants to the Joint FAO/WHO Expert Committee on Food Additives for toxicological evaluation and the development of specifications for the freezants.

#### Programme of Work for Ninth Session

64. The Group agreed to consider the following standards at its ninth session; the standards for Spinach, Peaches, Brussel Sprouts, Bilberries, Blueberries, Green Beans, Broccoli and Cauliflowers. It was agreed that these standards should be redrafted concerning quality requirements, defect tolerances and lot acceptance along the lines of the texts which had been agreed for quick frozen raspberries and spinach. The delegations of the following countries undertook to revise the standards as follows:

Brussels Sprouts and Green Beans	- United Kingdom
Peaches, Broccoli, Cauliflower and Blueberries	- United States
Bilberries	- Poland

65. It was further agreed that it would be necessary for the delegations of Poland and the United States of America to work together concerning the standards for bilberries and blueberries. The Group agreed that it would be necessary to consider further the "Procedure for the Checking of Temperatures" at its next session. In order to expedite the completion of work on the "Procedure for the Checking of Temperatures", it was agreed that a small drafting group be convened by the United Kingdom to prepare recommendations for the next session of the Group on the matters which had been raised concerning temperatures during local distribution, variation of temperature in retail cabinets and the sampling plan. The delegations of the following countries indicated their willingness to have their experts participate in the drafting group. France (Mr. Gac - to be approached through Mr. Gross); Federal Republic of Germany (Mr. Spiess); Denmark (Mr. Bramsnaes); Netherlands (Mr. van Hiele); Switzerland (to be advised through Mr.

Pfister); Norway (Mr. Lorensen to be approached through Mr. Knutsen); United States of America (Mr. Beacham or Mr. Dunn).

Election of Chairman and Vice-chairman

66. The Group unanimously re-elected Mr. T. van Hiele (Netherlands) and Mr. W. Orłowski (Poland) as Chairman and Vice-Chairman respectively to serve from the end of the eighth session until the end of the ninth session.

ALINORM 74/25  
APPENDIX I

LIST OF PARTICIPANTS\*  
LISTS DES PARTICIPANTS  
LISTA DE PARTICIPANTES

\* The Heads of Delegations are listed first. Les chefs de délégations figurent en tête. Figuran en primer lugar los jefes de las delegaciones.

ALGERIA  
ALGERIE  
ARGELIA

M. Mustapha  
Inspecteur Divisionnaire de la  
Répression des Fraudes  
Ministère de l'Agriculture et  
de la Réforme agraire  
12 Blv. Colonel Amirouche  
Alger

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MINERAL IMPURITIES IN QUICK FROZEN FRUITS AND VEGETABLES  
(prepared by USA)

Principle of Method

This method describes a procedure by which sand and other inorganic material is separated from plant tissue by a process of flotation and sedimentation. The sand and earthy particles being heavier sink to the bottom of the receptacle and the residue is then collected, incinerated, weighed and reported as "Mineral impurities".

"Mineral Impurities" as used in the text can be technically described as "Water Insoluble Inorganic Residue" and will include not only silica but also other matter such as particles of limestone.

2. Apparatus and Reagents

2.1 Apparatus

Blender or mascerator (Atomix, Turmix, Waring or equivalent)  
Beakers - 2,000 ml. capacity  
Funnels  
Filter Paper, Whatman No.1, or equivalent  
Porcelain or platinum crucibles  
Air oven or bunsen burner  
Muffle furnace (600°C)  
Desiccator with active dessicant  
Analytical balance

2.2 Reagents

Nacl solution (15%)

3. Preparation of Test Sample (Analytical Sub)

3.1 Fruit Products

- a. Containers of 500 g or less - use the entire contents (fruit plus any packing medium). Comminute in blender and transfer the entire mixture to the first beaker, using small quantities of water to assure complete transfer of material.
- b. Containers larger than 500 g - thoroughly mix the contents of the entire container and quickly remove a representative 500 g portion. Blend and transfer as specified in (a).

3.2 Vegetable Products

The method is similar to that specified in 3.1 for fruits except the analytical sub in 250 grammes. After the sub is placed in the blender a small amount of water may be necessary to facilitate masceration of the material.

4. Procedure

1. Transfer the analytical sub to a 2 litre (2L) beaker taking care to include any sand that might settle out.
2. Nearly fill the beaker with water and mix contents by swirling, using a stirring rod if needed.

3. Let stand about 10 minutes and decant supernatant material and water into a second 2 litre (2L) beaker.
4. Refill the first beaker with water, repeat the mixing and swirling operation and again let set 10 minutes.
5. Fill the second beaker with water, mix and swirl, and let stand 10 minutes.
6. At the end of the 10 minute period decant beaker No. 2 into beaker No. 3. Likewise decant beaker No. 1 in beaker No. 2.
7. Repeat the sequence carefully decanting supernatant from beaker No. 3 into sink, until all fruit tissue is removed from the sample.
8. Finally collect the residue from all the beaker in beaker No. 3.
9. Remove any seeds or fruit tissue that settle out by treating the residue in beaker No. 3 with hot 1 5% NaCl solution.
10. Remove NaCl by washing hot water. Removal can be verified by testing the washing with Ag NO<sub>3</sub>.
11. Finally transfer residue remaining in Step 10 to funnel fitted with ashless filter paper. Use small portion of water to assure transfer of all residue. Discard filtrate.
12. Transfer filter paper to a weighed crucible. Dry in air oven or over bunsen burner. Ignite in muffle furnace for about 1 hour at 600°C.
13. Cool in dessicator, and weigh.
14. The weight of water insoluble residue is determined by subtracting the weight of the empty crucible from the weight of the crucible plus incinerated residue.
15. Express the residue or mineral impurities on the basis of... mg per kilogramme,

If the test sample is 500 grammes, multiply the value obtained in Step 14 by two (2).

If the test sample is less than 500 grammes use the following formula -

$$X = \frac{1000}{W} (R)$$

in which

X = mineral impurities

W = weight of test sample (grammes)

R = residue remaining after incineration (milligrammes).

APPENDIX III

### DRAFT STANDARD FOR QUICK FROZEN RASPBERRIES

(Advanced to Step 8 of the Procedure)

#### 1. SCOPE

This standard shall apply to quick frozen raspberries of the species Rubus idaeus L. as defined below and offered for direct consumption without further processing, except for repacking if required. It does not apply to the product when indicated as intended for further processing or for other industrial purposes.

#### 2. DESCRIPTION

##### 2.1 Product Definition

Quick frozen raspberries are the product prepared from fresh, clean, sound, ripe and stemmed raspberries of firm texture conforming to the characteristics of Rubus idaeus L. (red, yellow or black varieties).

## 2.2 Process Definition

Quick frozen raspberries are the product subjected to a freezing process in appropriate equipment and complying with the conditions laid down hereafter. This freezing operation shall be carried out in such a way that the range of temperature of maximum crystallization is passed quickly. The quick freezing process shall not be regarded as complete unless and until the product temperature has reached -18°C (0°F) at the thermal centre after thermal stabilization. The product shall be maintained at a low temperature such as will maintain the quality during transportation, storage and distribution up to and including the time of final sale.

The recognized practice of repacking quick frozen products under controlled conditions is permitted.

## 2.3 Presentation

### 2.3.1 Style

Quick frozen raspberries may be presented as free-flowing (i.e. as individual berries not adhering to one another) or non free-flowing (i.e. as a solid block).

## 3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

### 3.1 Optional Ingredients

Sugars (sucrose, invert sugar, invert sugar syrup, dextrose, fructose, glucose syrup, dried glucose syrup).

### 3.2 Composition

#### 3.2.1 Raspberries prepared with dry sugars:

The total soluble solids content of the liquid extracted from the thawed comminuted sample shall be not more than 35 per cent m/m nor less than 18 per cent m/m expressed as sucrose, as determined by refractometer at 20°C.

#### 3.2.2 Raspberries prepared with syrup:

The amount of syrup used shall be no more than that required to cover the berries and fill the spaces between them. The total soluble solids content of the liquid extracted from the thawed, comminuted sample shall be not more than 30 per cent m/m nor less than 15 per cent m/m expressed as sucrose, as determined by refractometer at 20°C.

#### 3.2.3 Definition of "Defective" for Composition

Any sample unit that falls outside the limits for the soluble solids range specified in 3.2.1 and 3.2.2 shall be regarded as a "defective" provided it does not exceed the limits of the range by more than 5 per cent soluble solids.

#### 3.2.4 Lot Acceptance for Composition

A lot is considered acceptable for Compositional Criteria when the number of "defectives" does not exceed the acceptance number (c) for the appropriate

sample size of the Sampling Plans for Prepackaged Foods (AQL 6.5) (Ref. No. CAC/RM 42-1969).

### 3.3 Quality Factors

#### 3.3.1 General Requirements

Quick frozen raspberries shall be:

- of good, reasonably uniform colour, characteristic of the variety;
- clean, sound and practically free from foreign matter;
- free from foreign flavour and odour;

and with respect to visual or other defects with a tolerance shall be:

- practically free from sand and grit;
- when presented as free flowing, practically free from berries adhering one to another and which cannot be easily separated when in the frozen state;
- reasonably free from uncoloured berries;
- practically free from completely uncoloured berries;
- reasonably free from stalks (cap stems);
- practically free from extraneous vegetable matter;
- reasonably free from damage or blemish due to pathological injury or pests;
- normally developed;
- of similar varietal characteristics;
- reasonably free from disintegrated berries or berries not intact.

#### 3.3.2 Analytical Characteristics

Mineral impurities - not more than 0.05 per cent m/m on the whole product (berries and packing medium, if any).

#### 3.3.3 Free-flowing Characteristics

When presented as "free-flowing" a tolerance of 10 per cent m/m shall be allowed for berries which are stuck together and not easily separated in the frozen state.

The sample unit for "free flowing" is the entire contents of the container or as large a quantity as practicable.

#### 3.3.4 Definition of Visual Defects

- (a) Partially uncoloured berries - 25 to 75 per cent of the surface area without the colour characteristics of the variety.
- (b) Completely uncoloured berries - 75 per cent or more of the surface area without the colour characteristic of the variety.
- (c) Stalks (cap stems) - a stalk or portions of stalk, either loose or attached to the berry, and greater than 3 mm in length.
- (d) Extraneous vegetable material (EVM) - calyces or portion of calyces, leaves or other harmless extraneous vegetable material.

- (e) Blemished - any damage whether due to pathological injury or pests which materially affect the appearance of the berry:
- Minor blemishes are those that do not exceed the area of a circle having a diameter of 5 mm.
- Major blemishes are those that exceed the area of a circle having a diameter of 5 mm.
- (f) Not normally developed - berries containing shrivelled parts in the fruit flesh (drupelets)
- (g) Dissimilar varieties - berries that are significantly different in colour or shape due to varietal characteristics.
- (h) Disintegrated or not intact - berries in which more than 25 per cent of the berry is missing or berries which are crushed, broken or smashed into small pieces or flattened into a pulpy mass.

### 3.3.5 Tolerances for Visual Defects

3.3.5.1 Standard Sample Unit - the sample unit for segregation and evaluating visual defects shall be 300 grammes of drained berry ingredient.

Drained Berry Ingredient is determined as in 8.3.2

3.3.5.2 Tolerances for Visual Defects - based on standard sample unit size of 300 g. visual defects shall be assigned points in accordance with Table I. The maximum number of defects permitted is the "maximum Total Point" rating indicated for the respective categories minor, major, serious and total.

Table I

(Sample Unit - 300 grammes drained berries)

Defect	Unit of measurement	Direct Categories			Total
		Minor	Major	Serious	
(a) Partially uncoloured	Each berry	1			
(b) Completely uncoloured	Each berry			4	
(c) Stalks	Each piece		2		
(d) EVM	Each cm <sup>2</sup>		2		
(e) Blemished					
Minor	Each berry	1			
Major	Each berry		2		
(f) Undeveloped	Each berry	1			
(g) Dissimilar varieties	Each berry		2		
MAXIMUM TOTAL POINTS ALLOWABLE		15	10	4	20
(h) Disintegrated or not intact	Maximum of 55 per cent m/m				

3.3.6 Definition of "defective" for Quality Criteria - Any sample unit taken in accordance with the Sampling Plans for Prepackaged Foods (AQL-6,5)(Ref. No. CAC/RM 42-1969) shall be regarded as a "defective" for the respective characteristic as follows:

- (a) that exceeds the tolerance for mineral impurities (3.3.2)
- (b) that exceeds the tolerance for "free flowing" (3.3.3)
- (c) that exceeds the "Maximum Total Points" for "Visual Defects" in any one or more of the categories in Table 1 (3.3.5.2)
- (d) that exceeds the tolerance for "Disintegrated" in Table I (3.3.5.2)

### 3.3.7 Lot Acceptance for Quality Criteria

Any sample unit taken in accordance with the Sampling Plans for Pre-packaged Foods (AQL-6.5) (Ref. No. CAC/RM 42-1969) and subsequently adjusted to a standard sample unit of 300 grammes (except in the case of "free flowing") shall be regarded as "defective" for the respective characteristics as follows:

- (a) any sample unit that exceeds the tolerance for Mineral Impurities (paragraph 3.3.2)
- (b) any sample unit that fails the Tolerances for Visual Defects (paragraph 3.3.5) in one or more of the following respects:
  - (i) the maximum Allowable Points for the Defects Categories "Minor", "Major", "Serious" and "Total" exceeds the specified allowance;
  - (ii) disintegrated or Not Intact berries exceeds the specified allowance and in addition to (a) and (b)
- (c) any sample unit that exceeds the tolerance for "free flowing" (paragraph 3.3.3).

### 4. FOOD ADDITIVES None permitted.

### 5. HYGIENE

It is recommended that the product covered by the provisions of this standard be prepared in accordance with the Code of Hygienic Practice for Quick Frozen Fruits, Vegetables and their Juices (Ref. No. ALINORM 71/13, Appendix IV).

### 6. LABELLING

In addition to Sections 1, 2, 4 and 6 of the General Standard for the Labelling of Prepackaged Foods (Ref. No. CAC/RS 1-1969) the following specific provisions apply:

#### 6.1 The Name of the Food

- 6.1.1 The name of the food as declared on the label shall include "raspberries". The words "quick frozen" shall also appear on the label, except that the term "frozen"<sup>1/</sup> may be applied in countries where this term is customarily used for describing the product processed in accordance with sub-section 2.2 of the standard.

<sup>1/</sup> frozen": this term is used as an alternative to "quick frozen" in some English speaking countries.

- 6.1.2 In addition, there shall appear on the label in conjunction with, or in close proximity to the word "raspberries": (a) a reference to the colour for varieties other than the red variety; (b) the packing medium: "with (name of sweetener and whether as such or as the syrup)".

#### 6.2 List of Ingredients

A complete list of ingredients shall be declared, in descending order of proportion in accordance with sub-section 3.2 (c) of the General Standard for the Labelling of Prepackaged Foods (1969).

### 6.3 Net Contents

The net contents shall be declared by weight in either the metric system ("Système international" Units) or avoirdupois or both systems of measurement as required by the country in which the food is sold.

### 6.4 Name and Address

The name and address of the manufacturer, packer, distributor, importer, exporter or vendor of the product shall be declared.

### 6.5 Country of Origin

6.5.1 The country of origin of the product shall be declared if its omission would mislead or deceive the consumer.

6.5.2 When the product undergoes processing in a second country which changes its nature, the country in which the processing is performed shall be considered to be the country of origin for the purposes of labelling.

### 6.6 Additional Requirements

Information for keeping and thawing of the product shall be given on retail packs.

### 6.7 Bulk Packs

In the case of quick frozen raspberries in bulk the information required in 6.1 to 6.6 must either be placed on the container or be given in accompanying documents, except that the name of the food accompanied by the words "quick frozen" (the term "frozen" may be used in accordance with sub-section 6.1.1 of this standard) and the name and address of the manufacturer or packer must appear on the container.

## 7. PACKAGING

7.1 Packaging used for quick frozen raspberries must:

7.1.1 Protect the organoleptic and other quality characteristics of the product;

7.1.2 Protect the product against microbiological and other contamination;

7.1.3 Protect the product as far as practicable against dehydration, heat accumulation by radiation, and, where appropriate, leakage;

7.1.4 Not pass on to the product any odour, taste, colour or other foreign characteristics, throughout the processing (where applicable) and distribution of the product up to the time of final sale.

## 8. METHODS OF EXAMINATION, ANALYSIS AND SAMPLING

The methods of examination, analysis and sampling described hereunder are international referee methods which are to be endorsed by the Codex Committee on Methods of Analysis and Sampling.

### 8.1 Sampling

Sampling shall be carried out in accordance with the Sampling Plans for Pre-packaged Foods (AQL-6.5) (Ref. No. CAC/RM 42-1969).

## 8.2 Thawing Procedure

According to the FAO/WHO Codex Alimentarius Method: FAO/WHO Codex Alimentarius Standard Procedure for Thawing of Quick Frozen Fruits and Vegetables (Ref. No. CAC/RM 32-1970).

## 8.3 Test Procedures

### 8.3.1 Determination of Net Weight

According to the FAO/WHO Codex Alimentarius Method: Net Weight Determination of Frozen Fruits and Vegetables (Recommended International Standard for Quick Frozen Peas, Section 8.3, CAC/RS 41-1970, method CAC/RM 34).

### 8.3.2 Drained Berry Ingredient

- (1) Thaw the product until the berries are practically free from ice crystals and can be separated without damage.
- (2) Place the thawed product on a flat tray inclined to about a 17° angle.
- (3) Allow the syrup to drain to the lower end of the tray.
- (4) Carefully remove the berries to another tared tray until 500 grammes are obtained to make up the standard sample unit required for the evaluation of defects.
- (5) Add to the drained berry ingredient any stalks or extraneous vegetable matter that may be found in the syrup.

## 8.4 Analysis

8.4.1 Determination of mineral impurities: according to the method given in Appendix II to ALINORM 74/25.

8.4.2 Determination of total soluble solids content: according to the FAO/WHO Codex Alimentarius Method : FAO/WHO Codex Alimentarius Standard Procedure for Determination of Total Soluble Solids Content in Frozen Fruits (Ref. No. CAC/RM 36- 1970).

## APPENDIX IV

### DRAFT STANDARD FOR QUICK FROZEN SPINACH

(Returned to Step 6 of the Procedure)

#### 1. SCOPE

This standard shall apply to quick frozen spinach of the species Spinacia oleracea L. as defined below and offered for direct consumption without further processing except for repacking if required. It does not apply to the product when indicated as intended for further processing or for other industrial purposes.

#### 2. DESCRIPTION

##### 2.1 Product Definition

Quick frozen spinach is the product prepared from fresh, clean, sound, edible parts of spinach which have been sorted washed, sufficiently blanched to ensure adequate stability of colour and flavour during normal marketing cycles, properly drained and which conforms to the characteristics of the species Spinacia oleracea L.

##### 2.2 Process Definition

Quick frozen spinach is the product subjected to a freezing process in appropriate equipment and complying with the conditions laid down hereafter. This freezing operation shall be carried out in such a way that the range of temperature of maximum crystallization is passed quickly. The quick freezing process shall not be regarded as Complete unless and until the product temperature has reached  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) at the thermal centre after thermal stabilization. The product shall be maintained at a low temperature such as will maintain the quality during transportation, storage and distribution up to and including the time of final sale. The recognized practice of repacking of quick frozen products under controlled conditions is permitted.

##### 2.3 Presentation

###### 2.3.1 Style

Whole Spinach - the intact spinach plant with root removed.

Leaf Spinach - substantially whole, intact leaves most of which are separated from the root crown.

Cut-Leaf Spinach - parts of leaves of spinach generally larger than 20 mm. In the smallest dimension.

Chopped Spinach - parts of leaves of spinach cut into small pieces generally less than 10 mm in the largest dimension, but not comminuted to a pulp or puree - i.e. pieces smaller than 3 mm in dimension.

Pure Spinach - (Spinach Puree) - spinach finely divided or finely chopped such that it has the appearance of having passed through a sieve and the leaf particles less than 3 mm in dimension.

#### 3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

##### 3.1 Optional Ingredients

- salt

- condiments, such as spices and herbs.

### 3.2 Quality Factors

#### 3.2.1 General Requirements Quick frozen spinach shall:

- have a reasonably uniform green colour characteristic of the variety;
- be clean, sound and practically free from foreign matter;
- be free from foreign flavour and odour, taking into consideration any added optional ingredients;
- be practically free from fibrous material and for the styles of Whole, Leaf and Cut Leaf not materially disintegrated due to mechanical damage,

and with respect to Visual Defects or Other Defects subject to a tolerance shall be

- practically free from sand and grit;
- well drained and contain no excess water;
- practically free from loose or detached leaves in Whole style only;
- reasonably free from discoloured leaves or portions thereof;
- reasonably free from flower stems (seed heads);
- reasonably free from flower buds;
- reasonably free from crown and portion thereof, except for Whole spinach;
- practically free from root material;
- reasonably free from extraneous vegetable material (EVM).

#### 3.2.2 Analytical Characteristics

3.2.2.1 Mineral impurities - not more than 0.1% m/m.

3.2.2.2 Salt-free dry matter - not less than [5.5%] m/m.

3.2.2.3 Free water - not more than [35%] m/m (to be determined only if the product fails to meet the requirement for salt-free dry matter).

#### 3.2.3 Definition of Visual Defects

- |  |   |
|--|---|
| (a) Loose leaves (Whole style only)        | - leaves which are detached from the crown;   |
| (b) Discoloured leaves or portions thereof | - discolouration of any kind, which material detracts from the appearance of the product; |
| (c) Extraneous Vegetable Material (EVM)    | - harmless vegetable material such as grass, weeds, straw, etc.                           |
|  | Minor   |
|  | Major   |
| (d) Flower stems (Seed Heads)              | - EVM is green and tender   |
|  | - EVM is other than green or is coarse;   |
| (e) Flower buds                            | - the flower bearing portion of the spinach plant, which is longer than 25 mm;            |
|  | - the separate flower buds detached from flower head;                                     |
| (f) Crowns (exclusive of Whole style)      | - the solid area of the spinach plant between the root and the attached leaf clusters;    |
| (g) Root material                          | - any portion of the root, either loose or attached to leaves.                            |

#### 3.2.4 Tolerances for Visual Defects

##### 3.2.4.1 Standard Sample Unit Sizes

The sample unit for segregating and evaluating visual defects shall be as follows:

<u>Style</u>	<u>Sample Unit Size</u>
Whole and Leaf	300 grammes
Cut Leaf	300 grammes
Chopped	100 grammes
Puree	100 grammes

#### 3.2.4.2 Method of Examination

For separation and enumeration of visual defects the test sample (standard sample unit) is placed in water in a deep tray, and the leaves or leaf portion separated one by one.

3.2.4.3 Tolerances based on the standard sample sizes indicated in 3.2.4.1, visual defects shall be assigned points in accordance with the appropriate table in this section. The maximum number of defects permitted is the Total Point Allowance rating indicated for the respective Categories Minor, Major and Serious or the Combined Total of the Foregoing categories.

Table I

Whole Leaf and Cut Leaf Style (sample unit 300 grammes)

Defect	Unit of Measurement	Defect Categories			
		Minor	Major	Serious	Total
(a) Loose Leaves (whole style only)	Each leaf	1			
(b) Discolouration	Each 4 cm <sup>2</sup>	1			
(c) EVM - Minor		1			
Major	Each 5 cm		2		
(d) Seed Heads	Each whole		2		
	Head Each portion	1			
(e) Crowns (Exclusive of whole style)	Each whole		2		
	Each part	1			
(f) Root Material	Each Piece			4	
<b>TOTAL ALLOWABLE POINTS</b>		15	10	4	20

Table II  
Chopped Style  
(sample unit - 100 grammes)

Defect	Unit of Measurement	Defect Categories		
		Minor	Major	Total
(a) Discolouration	Each cm <sup>2</sup>	1		
(b) EVM	Each 1 cm			
		Minor		
		1		
			2	
(c) Flower Buds	Each 50 pieces	1		
(d) Crown Material	Each piece		2	
(e) Root Material	Each piece		2	
TOTAL ALLOWABLE POINTS .		15	10	20

Table III  
Pureed Style  
(sample unit 100 grammes)

Defect	Allowance
Any dark particle or flower buds	Shall not affect the overall appearance of the product.

### 3.2.5 Definition of "defective" for Quality Criteria

Any sample unit taken in accordance with the Sampling Plans for Prepackaged Foods, and which is adjusted to a standard sample unit size for applying the tolerances relating to Visual Defects, shall be regarded as "defective" for the respective characteristics as follows:

- (c) any sample unit that fails to meet the analytical requirements of paragraph 3.2.2.;
- (d) any sample unit that fails the Total Point Allowance for defect categories Minor, Major or Serious; or which fails the Total Point Allowance for the combined Total of the respective defect Categories (3.2.4.)

### 3.2.6 Lot Acceptance for Quality Criteria

A lot is considered acceptable when the number of "defectives" as defined in paragraph 3.2.5 does not exceed the acceptance number (c) for the appropriate sample size as specified in the "Sampling Plans for<sup>1</sup> Prepackaged Foods". In applying the acceptance procedure each "defective" (sub-paragraph (a) or (b) of 3.2.5) is treated individually for the respective characteristics.

## 4. FOOD ADDITIVES

None permitted.

## 5. HYGIENE

It is recommended that the product covered by the provisions of this standard be prepared in accordance with the Codex Alimentarius Code of Hygienic Practice for Quick Frozen Fruits, Vegetables and their Juices (Ref. No. ALINORM 71/13, Appendix IV)

## 6. LABELLING

In addition to sections 1, 2,4 and 6 of the General Standard for the Labelling of Prepackaged Foods (Ref. No. CAC/RS 1-1969) the following specific provisions apply:

### 6.1 The Name of the Food

6.1.1 The name of the food as declared on the label shall include "whole spinach", "leaf spinach", "cut leaf spinach", "chopped spinach" or "spinach puree".

6.1.2 The words "quick frozen" shall also appear on the label, except that the term "frozen" <sup>1/</sup> may be applied in countries where this term is customarily used for describing the product processed in accordance with sub-section 2.2 of the standard.

<sup>1/</sup> "Frozen": this term is used as an alternative to "quick frozen" in some English speaking countries.

### 6.2 List of Ingredients

A complete list of ingredients shall be declared, in descending order of proportion in accordance with sub-section 3.2 (c) of the General Standard for the Labelling of Prepackaged Foods.

### 6.3 Net Contents

The net contents shall be declared by weight in either the metric system ("Système International" units) or avoirdupois or both systems of measurement as required by the country in which the food is sold.

### 6.4 Name and Address

The name and address of the manufacturer, packer, distributor, importer, exporter or vendor of the product shall be declared.

### 6.5 Country of Origin

6.5.1 The country of origin of the product shall be declared if its omission would mislead or deceive the consumer.

6.5.2 When the product undergoes processing in a second country which changes its nature, the country in which the processing is performed shall be considered to be the country of origin for the purposes of labelling.

### 6.6 Additional Requirements

Information for keeping and cooking of the product shall be given on retail packs.

### 6.7 Bulk Packs

In the case of quick frozen spinach in bulk the information required in 6.1 to 6.6 must either be placed on the container or be given in accompanying documents, except that the name of the food accompanied by the words "quick frozen" (the term "frozen" may be used in accordance with sub-section 6.1.2 of this standard) and the name and address of the manufacturer or packer must appear on the container.

## 7. PACKAGING

7.1 Packaging used for quick frozen spinach must:

7.1.1 Protect the organoleptic and other quality characteristics of the product;

7.1.2 Protect the product against micro-biological and other contamination;

7.1.3 Protect as far as practicable against dehydration, heat accumulation by radiation, and, where appropriate, leakage;

7.1.4 Not pass on to the product any odour, taste, colour or other foreign characteristics, throughout the processing (where applicable) and distribution of the product up to the time of final sale.

## 8. METHODS OF EXAMINATION, ANALYSIS AND SAMPLING

The methods of examination, analysis and sampling described hereunder are international referee methods which are to be endorsed by the Codex Committee on Methods of Analysis and Sampling.

### 8.1 Sampling

Sampling shall be carried out in accordance with the Sampling Plans for Pre-packaged Foods (AQL-6,5) (Ref. No. CAC/RM 42-1969).

### 8.2 Thawing Procedure

According to the FAO/WHO Codex Alimentarius Method; FAO/WHO Codex Alimentarius Standard Procedure for Thawing of Quick Frozen Fruits and Vegetables, CAC/RM 32-1970.

### 8.3 Test Procedure

#### 8.3.1 Determination of Net Weight

According to the FAO/WHO Codex Alimentarius Method:

Net Weight Determination of Frozen Fruits and Vegetables (Recommended International Standard for Quick Frozen Peas, Section 8.3, CAC/RS 41-1970, Method CAC/RM 34).

8.3.2 Free Water Determination: according to the method for determination of drained weight for quick frozen spinach given in Appendix VI to ALINORM 74/25.

### 8.4 Analysis

#### 8.4.1 Determination of Salt-Free Dry Matter

8.4.1.1 Determine the total dry matter of the product by drying over sand for 4 hours at 105°C.

8.4.1.2 From the value obtained in 8.4.1.1 deduct the amount of salt (NaCl) determined by either (a) electrometric titration using a pH meter with a silver electrode; or (b) direct titration with Ag NO<sub>3</sub>. Express the result, after deducting salt from dry matter, as "Salt-free Dry Matter".

DRAFT CODE OF PRACTICE FOR THE PROCESSING AND HANDLING OF QUICK  
FROZEN FOODS

(Advanced to Step 8 of the Procedure)

SECTION I - SCOPE AND PURPOSE

1.1 This Code is intended to provide guidelines to Codex Committees for elaborating codes of practice or standards for specific quick frozen products \* or groups of products.

\* Detailed technical information may be found in a publication of the International Institute of Refrigeration, "Recommendations for the Processing and Handling of Frozen Foods".

1.2 This Code of Practice is intended to apply to quick frozen foods of all types which have been subjected to the process of quick freezing set out in Section III of this Code and which are offered for sale in the quick frozen state.

1.3 The recommendations are intended as a guide to assist in the production and handling of quick frozen foods in order to maintain their quality up to the time of final sale.

SECTION II - RAW MATERIALS AND PREPARATION

2.1 Only sound and wholesome raw materials should be used for the quick freezing process. Because quick freezing cannot improve the original quality of the foods being treated, only products at an optimum level of freshness and maturity should be quick frozen.

2.2 The selected raw materials should be in prime condition when processing begins. In order to minimize the rate of natural deterioration when storage prior to processing is a necessary stage in stock holding, all raw materials should be stored, for a period dictated by actual trade and material needs, in conditions capable of maintaining a temperature range and degree of relative humidity appropriate to the raw materials concerned.

2.3 To minimize micro-biological activity pre-cooked foods intended for quick freezing should not be held in the temperature range +10°C to 60 C. They should be cooled as rapidly as possible in suitable pre-cooling equipment consistent with requirements of hygienic processing. Whilst it is desirable that cooling and quick freezing should be carried out immediately, where this is not possible the food should be held at a temperature above 60°C (140°F) until cooling and subsequent quick freezing can take place.

SECTION III - QUICK FREEZING

3.1 After preparation the product should be quick frozen without delay. The quick freezing process should be carried out in appropriate equipment in such a way as to minimize physical, biochemical and micro-biological changes.

3.2 To achieve this the freezing operation should be carried out in such a way that the range of temperature of maximum crystallization (for most products -1°C to -5°C) (+30°F to +23°F) is passed quickly.

3.3 The process should not be regarded as complete unless and until the product temperature has reached -18 C (0°F) at the thermal centre after thermal stabilization.

3.4 Specific limits for freezing times and speeds are not given, as the requirements of both differ for various foodstuffs. Where necessary, specific indication should be made in individual food standards or Codes of Practice.

3.5 If the product is exposed to higher temperatures after quick freezing, effective measures should be taken to keep temperature rise to a minimum.

3.6 The recognized practice of repackaging quick frozen products should be carried out only under controlled conditions.

#### SECTION IV - STORAGE

4.1 Cold stores should be operated so as to maintain a product temperature of  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) or lower with a minimum of fluctuation.

4.2 Excessive product temperature fluctuations either in range or frequency are undesirable. They may lead to serious dehydration in susceptible products and to other forms of quality deterioration. Although temperature fluctuations are generally less harmful at lower storage temperatures, variations greater than 2 Centigrade degrees (4 Fahrenheit degrees) in the air temperature should, so far as possible, be avoided.

4.3 Frequent temperature checks should be carried out, preferably with recording thermometers or devices that will continually monitor storage temperatures.

4.4 The air velocity in cold stores should be moderate and no higher than necessary to achieve sufficiently uniform temperatures within the store.

4.5 Products should be stacked so that air circulation is not impaired. No direct contacts with the walls - except in jacketed rooms - ceiling or floor should be allowed. The distance between the stored products and the walls, ceiling or floor should be at least 10 cm (4 in.).

4.6 A system of controlled stock rotation should be employed in cold stores.

#### SECTION V - TRANSPORT AND DISTRIBUTION

5.1 The transport of quick frozen foods over a long period of time should be carried out in equipment capable of maintaining and so operated as to maintain a product temperature of  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) or lower. Vehicles should be pre-cooled to  $+10^{\circ}\text{C}$  ( $50^{\circ}\text{F}$ ) or lower prior to loading and should be equipped with devices to record temperatures during transport.

5.2 A temperature rise of the product during transport to  $-15^{\circ}\text{C}$  due to unforeseen circumstances may be tolerated but any product temperature higher than  $-18^{\circ}\text{C}$  should be reduced as soon as possible either during transport or immediately after delivery to  $-18^{\circ}\text{C}$ .

5.3 Loading into and unloading from vehicles and into and from stores should be as fast as practicable and the methods used should minimize product temperature rise.

5.4 During the transport as indicated in 5.1 frequent temperature checks should be carried out using methods of recording temperatures of the load visible outside of the vehicle.

5.5 During unloading the vehicle as indicated in 5.1 and before entering the cold store, the product temperature should be checked.

5.6 Transport of quick frozen foods for local distribution should be carried out in such a way that the temperature rise is kept at a minimum. <sup>1/</sup>

<sup>1/</sup> It is intended to give further specifications of the temperature and its measurement as soon as additional experience makes this possible.

5.7 A temperature rise of the product occurring during local transport as indicated in 5.6 should be reduced to -18 C as soon as possible after delivering. When this is not possible the product should be offered for sale as soon as possible.

## SECTION VI - RETAIL SALE

6.1 Quick frozen foods should be offered for sale from refrigerated cabinets designed for the purpose.

6.2 The cabinets should be capable of maintaining and be so operated as to maintain a product temperature of -18°C (O°F) and should be equipped with a thermometer.

6.3 A rise in product temperature may be tolerated for short periods but the product temperature should not be allowed to become higher than -15°C (5°F), except for the top layer where a higher temperature may be tolerated. <sup>2/</sup>

<sup>2/</sup> It is intended that precise temperature be specified in this section after a review of data obtained from additional experience.

6.4 Warm air currents from the outside should not blow directly into the refrigerated space. Cabinets should be located so that the open display area is not subjected to abnormal radiant heat (e.g. not in direct sunlight, under strong artificial light or in direct line with heaters). Cabinets should be covered at night and over the weekend. Defrosting cycles should be programmed in such a way that, as much as possible, defrosting takes place outside the normal shopping hours.

6.5 The contents of the cabinet should never be stocked outside the load line. Stocks should not be removed from and returned to the cabinet except when absolutely necessary.

6.6 Unpacked products are subject to risks of contamination and dehydration and should be stored and displayed in compartments separate from those used for packaged quick frozen foods.

6.7 Foods which are not quick frozen should not be placed in a cabinet which contains quick frozen foods. Prepackaged edible ices may, however, be kept in cabinets containing quick frozen foods.

6.8 Stocks should be carefully rotated to ensure that the products are sold on a "First In First Out" basis.

## SECTION VII - PACKAGING

7.1 The packaging should be designed to:

7.1.1 protect the organoleptic and other quality characteristics of the product;

7.1.2 protect the product against micro-biological and other contamination;

7.1.3 protect as far as practicable against dehydration, heat accumulation by radiation, and, where appropriate, leakage;

7.1.4 not pass on to the product any odour, taste, colour or other foreign characteristics, throughout the processing (where applicable) and distribution of the product up to the time of final sale.

7.2 Retail packages should be preserved intact up to the time of final sale,

## SECTION VIII - HYGIENE

8.1 The maintenance of good hygiene is important throughout the preparation, freezing process, transport and distribution right up to and including the time of final sale.

8.2 Quick frozen foods should always comply with the provisions of the General Principles of Food Hygiene and, where appropriate, with Codes of Hygienic Practice relevant to a particular food.

### APPENDIX VI

#### DETERMINATION OF DRAINED WEIGHT OF QUICK FROZEN SPINACH

(Prepared by The Netherlands in consultation with  
the United States of America)

1. TITLE

Determination of the drained weight of quick frozen spinach.

2. SCOPE

The method is applicable to quick frozen spinach.

3. DEFINITION

The drained weight is the weight of the thawed product after discarding the fluid part by draining it on a sieve during a certain time.

4. PRINCIPLE

The product is thawed under standardized conditions and then transferred to a sieve with standardized dimensions. After a certain time the sieve and product are weighed. The quantity of product can be used as a guide to consistency.

5. APPARATUS

5.1 Waterbath, regulated thermostatically.

5.2 Balance of adequate capacity, accuracy 1 gm.

5.3 Polyethylene bags  $\pm 39 \times 15$  cm, thickness  $\pm 0.12$  mm, well to close.

4.3 Seal apparatus for polyethylene bags.

5.5 Round sieves, made of polyvinylchloride tube and stainless steel wire with the following dimensions:

sieve opening 0.84 mm; thickness of the wire 0.37 mm;  $\pm 55$  openings/cm<sup>2</sup>

for	150 gms:	inside	diameter	of	tube	49 mm
"	300 gms:	"	"	"	"	71 mm
"	450 gms:	"	"	"	"	86 mm
"	600 gms:	"	"	"	"	101 mm
"	750 gms:	"	"	"	"	113 mm
"	900 gms:	and more: inside diameter of tube 125 mm				

5.6 Funnels in rack, in which the sieves are placed at water-level.

5.7 Beakers, cylinders or other containers in which the liquid is caught.

5.8 Scraping-knife.

## 6. PROCEDURE

6.1 Large packages (<900 gms) are divided into 2 or more pieces of suitable quantity, of which the drained weight has to be determined separately. The sum of the drained weight of the different pieces represents the total drained weight.

6.2 The spinach + packing are weighed.

6.3 The packing is discarded and weighed.

6.4 The spinach is transferred into a polyethylene bag and well closed,

6.5 The bag with spinach is thawed in a waterbath at a temperature of 80°C, The thawing-time will be dependent on the number and the size of the bags to be treated. The temperature in the centre of the bag must be about 75°C. Example: 10 bags of ± 450 gm will take 2 hours.

6.6 After complete thawing the bag is snipped open.

6.7 The spinach is carefully transferred to a sieve, prepared according to 5.6, that fits the packing unit and smoothed (no pressing). The draining time enters at this moment.

6.8 The rest of the spinach in the bag is well scraped together with a scraping-knife and also transferred to a sieve.

6.9 After a draining time of 20 minutes, sieve and spinach are weighed.

6.10 The spinach is discarded, the sieve is cleaned, dried and weighed.

## 7. EXPRESSION OF RESULTS

7.1 Drained weight is the weight of spinach plus sieve (6.9) minus weight of sieve (6.10).

7.2 Drained weight as a percentage of net weight is drained weight (7.1) divided by net weight (6.2 minus 6.3) multiplied by 100.

PROCEDURE FOR CHECKING TEMPERATURE OF QUICK FROZEN FOODS  
(For reconsideration at Step 4)

1. SCOPE

The procedures outlined hereafter for measuring temperatures are generally applicable to all quick-frozen foods.

Three methods are proposed, namely:

- (a) Method I - Measuring product temperature - 4, 5 and 6 below
- (b) Method II - Measuring surface temperature - 7, 8 and 9 below
- (c) Method III - Measuring air temperature - 10, 11 and 12 below

2. DEFINITION

"Temperature", for the purposes of this document, is the temperature measured at the point of placement of the sensitive part of the sensing element.

3. SPECIFICATIONS FOR TEMPERATURE INDICATING AND RECORDING INSTRUMENTS

Only equipment that meets the following requirements should be used for control purposes:

- (a) The half-value period should not exceed 0.5 minute.
- (b) The instrument should be accurate to within  $\pm 0.5^{\circ}\text{C}$  over the range  $-30^{\circ}\text{C}$  to  $+30^{\circ}\text{C}$ .
- (c) It should be sensitive to changes of  $0.5^{\circ}\text{C}$
- (d) The accuracy of the measurement should not be affected by the temperature of the surroundings.
- (e) Markings on the scale should be in divisions of  $1^{\circ}\text{C}$ .
- (f) For measuring equipment other than glass-stem thermometers, a setting device to allow adjustment of the indicating needle during recalibration should be provided.
- (g) The sensitive part of the measuring device should be so constructed as to ensure good contact with the product.
- (h) Electrical equipment should be protected from undesirable influences resulting from condensation of moisture.

4. METHOD I - Measuring Temperature in the Product - (Reference Method)

- (a) Reliable information on the temperature of a product can be obtained only by measuring the temperature in the product.
- (b) The product temperature should be measured at any point in the product which is 2.5 cm below the surface. In the case of packages with one dimension less than 5 cm, the measurement point should be half-way through this dimension.
- (c) It is preferable to reach this point by inserting the sensing element so that as much of it as is practicable is in the product.

(Diagram to illustrate method of measuring product temperature: see Figure 1 in Attachment to this Appendix).

5. EQUIPMENT FOR MEASURING TEMPERATURE IN THE PRODUCT

### 5.1 Glass Stem Thermometer

The glass stem thermometer should have the following characteristics:

- (a) An overall length of about 25 cm.
- (b) A sharp pointed round stem.
- (c) A pocket carrying case to protect the thermometer.
- (d) Alcohol filling is preferred to mercury.

Glass stem thermometers should be used with great care in proximity of food.

### 5.2 Metal Dial Thermometer

(Equipment may be based on the principle of Liquid expansion, Vapour pressure change, Spring deformation or Metal expansion)

The metal dial thermometer should have the following characteristics:

- (a) An overall length of about 15 cm.
- (b) A sharp pointed stainless steel stem.
- (c) A pocket carrying case to protect the thermometer.
- (d) A dial, hermetically sealed with plastic and not with glass.

### 5.3 Electrical Thermometer

(Electrical resistance or thermocouple as the sensing element).

The sensing element of the electrical thermometer should have the following characteristics:

- (a) An overall length of about 15 cm.
- (b) A sharp pointed stainless steel sensitive part.
- (c) Leads of known resistance or, preferably, leads with built-in compensation resistance.

### 5.4 Electrical Temperature Recording Instruments

These instruments are in principle built on to the equipment described in subsection 5.3. These instruments should be able to record temperatures on suitable charts over a determined period of time.

### 5.5 Instruments for Making Holes in the Product

A sharp pointed metal instrument such as an ice pick or hand drill which can easily be cleaned should be used. The hole in the packet and product should be only marginally larger in diameter than the sensitive part of the sensing element to be used.

## 6. PROCEDURE FOR MEASURING TEMPERATURE IN THE PRODUCT - (Reference Method)

6.1 Making a hole - Sensing elements are in general insufficiently robust to penetrate into blocks of frozen food. A hole should be made in the packages concerned using a probe or hand drill as specified in sub-section 5.5. The hole should be 5 cm deep.

### 6.2 Pre-cooling

A package should be selected at random from the load for use in pre-cooling the probe or hand drill and the sensing element. This will be referred to hereafter as the precool package. A warm probe, hand drill or sensing element should never be placed in the test package.

The sensing element should be inserted into the centre of the precool package and it should be left there for at least 2 minutes. It should not be removed from the precool package until it can be inserted in the test package.

Pre-cooling can also be carried out between packages or just by allowing the equipment to stand in cold air of about the same temperature.

### 6.3 Temperature Reading

The sensing element should be removed from the precool package and immediately inserted into the test package at a depth as indicated in sub-section 4 (b). The temperature should be read when this has reached a steady value or should be recorded continuously according to the equipment used.

## 7. METHOD II - MEASURING SURFACE TEMPERATURE OF THE PRODUCT - (Practical Method)

- (a) A reasonable approximation as to the temperature of the product can be obtained by measuring the temperature at the surface of the product.
- (b) The surface temperature of a product can be obtained in a non-destructive way and is sufficiently accurate for routine temperature checks, provided good contact is achieved by the sensing element between the packages or cases.
- (c) By applying adequate pressure, the readings are generally within  $\pm 1^{\circ}\text{C}$  of the product temperature.
- (d) The sensitive part of the sensing element should be inserted at least 5 cm between the packages or cases.

(Diagram to illustrate method of measuring surface temperature of a product: see Figure 2 in the Attachment to this Appendix).

## 8. EQUIPMENT FOR MEASURING SURFACE TEMPERATURE OF THE PRODUCT

### 8.1 Glass Stem Thermometer

The glass stem thermometer should have the following characteristics:

- (a) An overall length of about 25 cm.
- (b) An elliptical diameter not more than 5 mm thick, such as to ensure as little air leakage between the packages as possible.
- (c) A pocket carrying case to protect the thermometer.
- (d) Alcohol filling is preferred to mercury.

Glass stem thermometers should be used with great care in proximity to food.

### 8.2 Metal Dial Thermometer

(Equipment may be based on the principle of Liquid expansion, Vapour pressure change, Spring deformation or Metal expansion)

The metal dial thermometer should have the following characteristics:

- (a) An overall length of about 15 cm.
- (b) A flat stainless steel stem not more than 5 mm thick.
- (c) A pocket carrying case to protect the thermometer.
- (d) A dial, hermetically sealed with plastic, not glass.

### 8.3 Electrical Thermometers

(Electrical resistance or thermocouple as the sensing element).

The sensing element of the electrical thermometer should have the following characteristics:

- (a) An overall length as short as possible.
- (b) A flat stainless steel construction not more than 5 mm thick.
- (c) Leads of known resistance or, preferably, leads with built-in compensation resistance.

### 8.4 Electrical Temperature Recording Instruments

These instruments are in principle built on to the equipment described in subsection 5.3. These instruments should be able to record temperatures on suitable charts over a determined period of time.

## 9. PROCEDURE FOR MEASURING SURFACE TEMPERATURE OF THE PRODUCT - (Practical Method)

This method is especially applicable to measuring temperature in full loads and master packages and is therefore applicable only in cold stores, during loading and unloading and during transportation.

### 9.1 Selecting Cases

7 packages or cases of frozen foods should be selected from the lot in question. Any 3 of the 7 should be stacked on the floor area of the natural cold environment for the lot being sampled.

A side wall of top case (number 3 of stack) should be cut at either end with a sharp knife as shown in Figure 2 of the Attachment to this Appendix.

### 9.2 Temperature Reading

The cut tab should be bent outward.

The sensing element should be inserted at about the centre of the first stack of packages and between the first and second layers of packages so that all of the sensing element is in firm contact with package walls.

The other 4 cases should be stacked on top of the case containing the sensing element.

The temperature should be read when this has reached a steady value or should be recorded continuously according to the equipment used.

The cut sidewall area of the case should be closed and taped after use.

## 10. METHOD III - MEASURING TEMPERATURE OF THE AIR SURROUNDING THE PRODUCT

- (a) A rough approximation which may, however, be inaccurate, as to the temperature of the product, can be obtained by measuring the temperature of the surrounding air .
- (b) The temperature of the air surrounding a product can be measured under practical conditions during storage, transport and distribution (including retail cabinet).
- (c) The temperature of the air surrounding a quick-frozen product does not necessarily represent the temperature of the product. Depending on

conditions, the temperature of the surrounding air may be higher or lower than that of the product.

- (d) Under certain conditions air temperature may provide a good approximation as to the product temperature. These conditions are:
  - (i) A stabilized temperature in the loading space.
  - (ii) No air currents.
  - (iii) A relatively slow response rate of the instrument.
  - (iv) Measurements made over at least 30 minutes show no noticeable fluctuation.

Such conditions generally prevail only in a storage-room and between the frozen product covered with a master pack.

## 11. EQUIPMENT FOR MEASURING TEMPERATURE OF THE AIR SURROUNDING THE PRODUCT

11.1 The equipment described in sub-sections 5.1 to 5.4 may be used subject to the conditions set out under sub-section 10 (d) above.

11.2 Mechanical temperature recording instruments may also be used. These instruments consist of a self contained unit. The sensitive element is generally directly connected to the recording part and adequately protected during handling. Instruments of this sort can be placed in cases of the product, replacing some of the packs in the case and will give readings of the air temperature. These instruments should be pre-cooled before insertion into the case. They provide a relatively uncomplicated method of measuring temperature surrounding the product at a certain spot over a period of time.

## 12. PROCEDURE FOR MEASURING TEMPERATURE OF THE AIR SURROUNDING THE PRODUCT

### 12.1 Positioning the sensitive element

The sensitive element should be surrounded by the quick frozen product and protected from direct colder or warmer air currents.

12.2 Recording Instruments appropriate to this sort of measurement can be placed in cases of the product, replacing some of the packs.

### 12.3 Temperature Reading

The temperature fluctuations should be read over a period of 10-30 minutes, depending on the degree of fluctuation.

## 13. CALIBRATION OF THERMOMETERS

13.1 Thermometers should be checked at regular intervals depending on how consistent they are for accuracy. Instruments handled from one load to another should be checked weekly. Instruments used during transport should be checked before a new load is to be carried.

13.2 The test can be made by immersing the thermometer sensing element in an ice water bath. A litre container (vacuum flask) should be filled with chipped ice and then filled entirely with cold water. It should be stirred for at least 2 minutes, before the sensing element is inserted into the centre of the mixture. The sensing element should be allowed to touch the container. The temperature indicated by the thermometer should be observed after pausing for at least 2 minutes to allow stabilization to take place. The immersed thermometer should read within 0.5°C,

plus or minus, of 0°C. The 0°C point on the scale should emerge just above the top of the flask. All other elements should be entirely in the ice.

- 13.3 For checking the thermometer at temperatures in the range of -18°C to -21°C, a brine mixture consisting of 1 part by weight of table salt and 3 parts by weight of chipped ice should be used. The reading of the thermometer being tested should be compared with that of a thermometer known to be accurate.
- 13.4 Both temperature sensors should be inserted into the brine mixture with the stems next to each other, and they should not touch the container. The temperatures indicated by the thermometers should be observed after pausing for at least 2 minutes to allow stabilization to take place. Thermometers can also be checked by comparing the reading from the thermometer being tested with the thermometer which is known to be accurate when both are held alongside each other in the same ambient.
- 13.5 If no reference thermometer is available, an eutectic mixture of analytical grade sodium chloride and ice, intimately mixed, gives a temperature of -21.4°C.
- 13.5 If an error is indicated greater than 0.5°C (1°F), then the indication of the thermometer should be corrected by means of its standard adjustment mechanism. After adjustment, the indication of the thermometer should be re-checked.

#### 14. FULL SAMPLING

##### 14.1 Selection of Test Packages

The selection of location from which to take test packages for temperature measurement is difficult to specify precisely and must be a matter of judgement, taking account of any previous history of the load or lot being examined and also the results obtained as the sampling proceeds. The correct interpretation of the results depends to a very large extent, on informed sampling. Test packages should be selected in such a way that their temperatures will be representative, but for commercial reasons the minimum number of checks should be made to give temperatures representative of the stock being examined.

##### 14.2 Sampling in Various Locations

###### 14.2.1 Cold Stores

If cases are stacked closely together, e.g. on a pallet, then temperature readings should be taken from a package on an outer face of an outer case, and from a package from a case in the centre of the lot. These temperatures are known as "outer temperatures" and "centre temperatures". If individual cases are being examined, then a pack should be selected from at least one layer in from the outside of the case. A significant difference between the two readings will indicate a temperature gradient in the pallet load and may lead to taking more temperatures if the previous history of the pallet load suggests that elevated temperatures recorded have been sustained for a sufficient period of time to cause significant quality loss.

###### 14.2.2 Vehicles or Transport Container Unit

When unloading, packages should be selected for temperature measurement from the locations shown in Figure 3. These packages normally will give product temperatures representative of the load. Any additional locations judged to be

useful may be tested taking into account the sensitivity of the product to thermal shock, knowledge of the duration of the journey, etc.

### 14.2.3 Retail Display Cabinets

[The following two alternative texts are submitted for comment:]

(a) Federal Republic of Germany

Shop cabinets (Products not removed from cabinet during checks). Select packages according to ISO/TC 86 103 <sup>1/</sup> from the front or upper layer of the cabinet. For routine checking a considerably reduced number of samples can be used.

<sup>1/</sup> See Appendix VIII of this Report.

(b) United Kingdom

Shop cabinets (Products not removed from cabinet during checks).

(i) Bin Cabinets

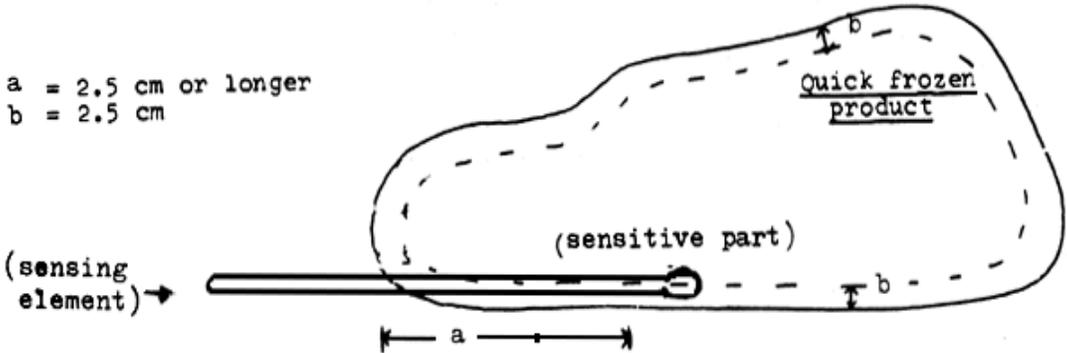
A product in the top layer of the cabinet should be selected and its temperature measured. The cabinet should be checked that it is not on defrost or recovering from a defrost cycle, and it should be noted if the indicated product temperature is within the range allowed by International Standards. If the indicated temperature is outside the allowed range, then the temperature at the centre and base of the cabinet should be taken before acting on the first result.

(ii) Vertical Cabinets

In addition the temperature of products on the front of shelves at the right and left hand sides of the cabinet should be taken. The indicated readings should be within those allowed by International Standards.

Figure 1

Diagram to illustrate method of measuring product temperature

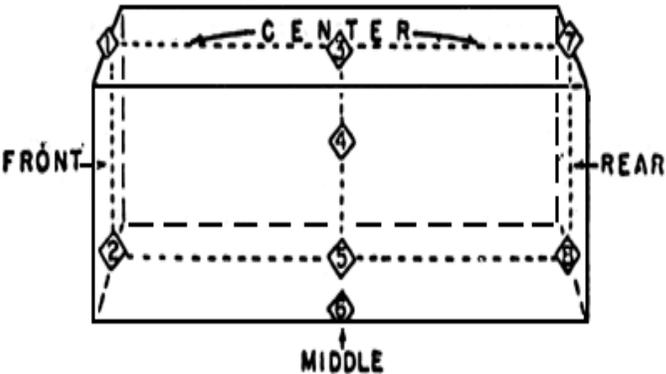


Side View, Case of 24 Solid Packed Product



Figure 2

1. Cut case sidewall
2. Bend cut tab
3. Insert probe

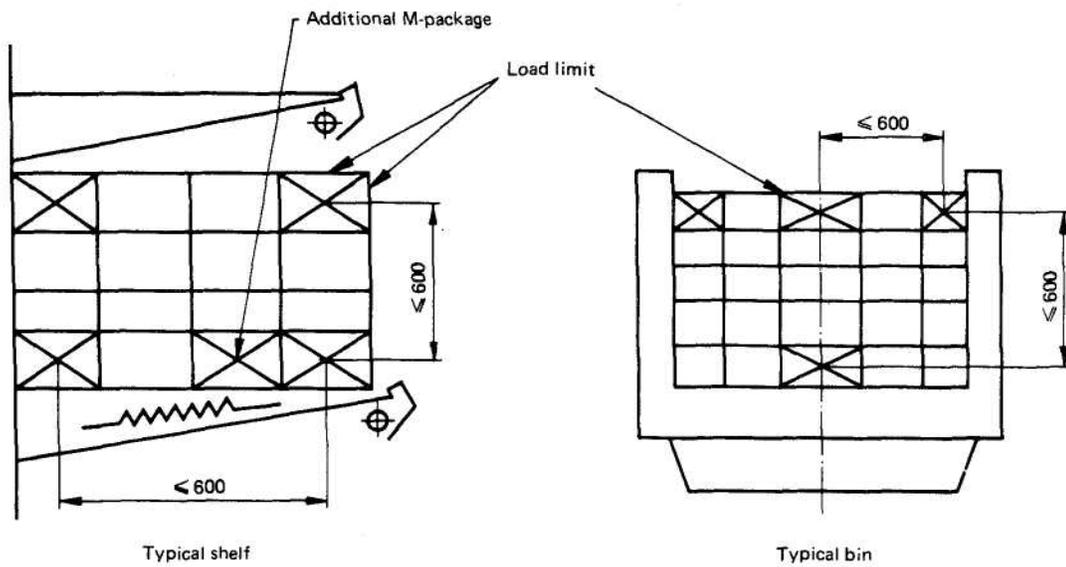


1. Top, front, centre
2. Bottom, front, centre
3. Top, middle, centre
4. Half way up, middle, center
5. Bottom, middle, center
6. Bottom, middle, side (next to door if there is a side door)
7. Top, rear, centre
8. Bottom, rear, centre

Figure 3 - Suggested locations in the car or truck from which test packages should be selected.

Determination of Test Package Temperatures in  
Commercial Refrigerated Cabinets intended for  
the Display and/or Retail Sale of Food Products

Dimensions in millimetres



 = M-package

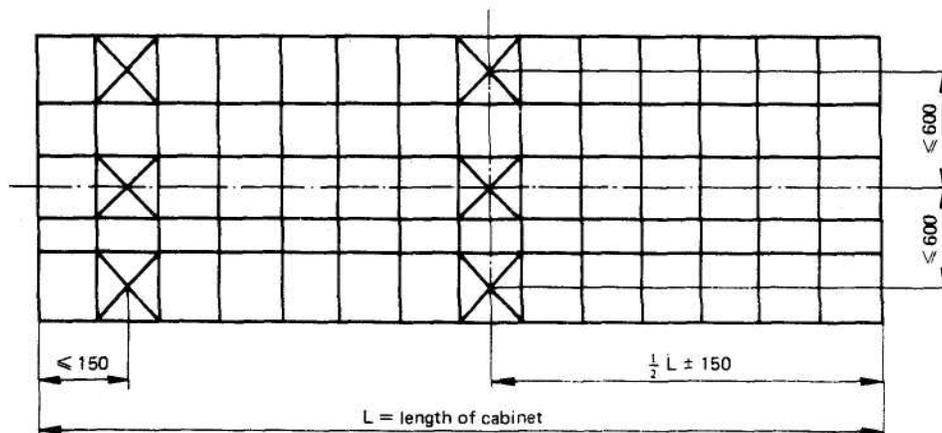


FIGURE 1 Location of M-packages ( test packages with temperature sensor)