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TEXTS FOR ADOPTION AS NEW UNECE STANDARDS

Hen Egg Products for use in the Food Industry

Note by the secretariat

This draft standard has been prepared following the decision of the Working Group on Agricultural Quality Standards to begin revision of the UNECE standards for eggs and egg products (document ECE/TRADE/C/WP.7/2007/27, para. 35). The text was discussed at the Seminar on Standards for Eggs and Egg Products held in Nizhniy Novgorod, Russian Federation, in September 2008. It takes into consideration comments from Poland, the Russian Federation, the United States of America and the European Commission.

At its eighteenth session in April 2009, the Specialized Section on Standardization of Meat has finalized the text and submitted it to the Working Party for approval as a revised standard for trial use for a period of one year.

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UNECE STANDARD EGG-2

CONCERNING THE MARKETING AND COMMERCIAL QUALITY CONTROL OF HEN EGG PRODUCTS FOR USE IN THE FOOD INDUSTRY

I. INTRODUCTION

A. UNECE standard for egg products

1. The purpose of the UNECE standard for egg products is to facilitate trade by recommending an international language for use between buyer and seller. The language describes egg products traded internationally and defines a coding system for communication and electronic trade.

2. As the standard is updated regularly, egg-product manufacturers who believe that changes are needed are encouraged to contact the UNECE secretariat. Changes requiring immediate attention are published on the UNECE website at: <www.unece.org/trade/ agr/standards.htm>.

3. In chapter III on the UNECE coding system, the following code is used for egg products:

Egg product	**UNECE code** (data field 1)
Hen-egg product	90

B. Scope

4. This standard recommends an international language for products made from eggs obtained from hens of the species *Gallus gallus* which are intended for use in the manufacture of food for human consumption and produced as UNECE quality foodstuffs. It provides a variety of options to purchasers for grading, packing, labelling and other aspects of egg products traded internationally.

5. To ensure that items comply with the requirements of this standard, purchasers may choose to use the services of an independent, unbiased third party.

6. To supply egg products across international borders, legislative requirements relating to food hygiene and veterinary inspection must be complied with. The standard does not attempt to prescribe those aspects, which are covered elsewhere: such provisions are left for national or international legislation or the requirements of the importing country.

7. The standard contains references to other international agreements, standards and codes of practice which aim to provide guidance to Governments on upholding quality. The appropriate Codex Alimentarius Commission standards and codes, and in particular the Code of Hygienic

Practice for eggs and egg products[1] should be consulted as the international reference concerning health and hygiene requirements.

C. Definitions used in the standard

8. **Egg products** means all, or a portion of, the contents found inside eggs separated from the shell, with or without added ingredients, intended for human consumption. An egg product may contain food ingredients and food additives intended to give them certain characteristics and/or to preserve their quality. Additives should be approved as edible under the Codex Alimentarius Commission regulations on foodstuffs[2] and permitted for use in importing countries.

9. **Food raw materials for production of egg products** are raw materials of plant, animal, microbiological, mineral or artificial origin and water used to produce foodstuffs, excluding food and biologically active additives.

10. **Food additives** are natural and/or artificial materials and combinations of such materials introduced into foodstuffs to give them specific characteristics and/or preserve their quality, the use of which is authorized by the Codex Alimentarius Commission regulations on foodstuffs and permitted in importing countries.

11. **Food ingredients** are the constituent elements of foodstuffs specified in their composition.

12. **Whole egg without shell (melange)** is the homogeneous product obtained from the complete contents of broken-out hen eggs-in-shell, in accordance with good manufacturing practice. Small quantities of egg albumen or egg yolk may be added to whole egg in order to standardize the product so that the compositional requirements set out in the table in annex I are met.

13. **Liquid egg product** is a product obtained from whole eggs without shell (melange), egg albumen and egg yolk without adding or removing water.

14. **Egg yolk** is the homogeneous product produced from the separation of the yolk of broken-out hen eggs-in-shell, in accordance with good manufacturing practice. Small quantities of egg albumen may be added to egg yolk in order to standardize the product so that the compositional requirements set out in the table in annex I are met.

15. **Egg albumen**[3] is the homogeneous product obtained from the separation of the egg albumen of broken-out hen eggs-in-shell, in accordance with good manufacturing practice.

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[1] The Joint FAO/WHO Codex Alimentarius Commission Code of Hygienic Practice for Eggs and Egg Products, CAC/RCP 15-1976, adopted 1976, amendments 1978, revision 2007. In European Union countries, regulations (EC) No. 852/2004 and (EC) No. 853/2004 on the hygiene of foodstuffs are also applicable to egg products.

[2] Joint FAO/WHO Food Standards Programme. Codex Alimentarius Commission. Procedural Manual, seventeenth edition, 2007 (updates can be found at: <www.codexalimentarius.net/web/procedural_manual.jsp>). Codex General Standard for Food Additives, CODEX STAN 192-1995, adopted in 1995, revision 1997, 1999, 2001, 2003, 2004, 2005, 2006, 2007, 2008 (www.codexalimentarius.net/gsfaonline/CXS_192e.pdf).

[3] Except for egg albumen obtained by the centrifugal separation of broken-out hen eggs.

16. **Frozen egg product** is a product obtained from a liquid egg product which has been subjected to a freezing process, including deep freezing, and maintained in its frozen state.

17. **Dried egg product** is a product obtained from a liquid egg product from which water has been removed by a drying process to give a product in powder or granulated form.

18. **Concentrated (condensed) egg product** is an egg product with a higher solids content than the equivalent liquid or frozen product obtained by the removal of water. The specific value of the higher solids content in a concentrated egg product is agreed between buyer and seller.

19. **Blended egg product** is an egg product prepared in such a way that the proportion of the constituents of broken-out hen eggs-in-shell is altered in comparison with the whole egg, egg yolk and egg albumen. The specific value of the proportion of the constituents in a blended egg product is agreed between buyer and seller.

20. **Conventional (natural) egg product** is an egg product obtained using conventional methods without the use of special procedures to alter the egg's properties and/or composition.

21. **Modified egg product** is an egg product whose properties have been altered using special procedures which are consistent with good manufacturing practice.

22. **Fermented egg product** is an egg product obtained through the action of fermentation agents, which are used to alter its properties (e.g. enhancing its natural functional properties: foamability, emulsification) and/or to stabilize (desugar) it. Cultures or agents used to ferment/stabilize egg products must be authorized as referenced in paragraph 10 above.

23. **Stabilized egg product** is an egg product obtained by desugaring with the use of special procedures (such as fermentation or ultrafiltration).

24. **Acidified egg product** is an egg product obtained by adding acidity regulators (additives intended to alter the product's pH level).

25. **Heat-treated egg albumen** is dried egg albumen which has been subjected, in accordance with good manufacturing practice, to a high temperature for a specific period of time to enhance its foaming properties.

26. **Salted or sugared egg product** is an egg product obtained by adding salt or sugar in quantities prescribed by good manufacturing practice.

27. **Commodity lot** is a quantity of egg product produced between planned breaks in production.

II. QUALITY REQUIREMENTS

28. The purpose of this standard is to define the quality requirements which egg products must satisfy at all stages of marketing after their preparation and packaging.

A. Minimum requirements

29. All types of egg product shall be made with Class B and Class A eggs obtained from farmed hens of the species *Gallus gallus* and produced in establishments regularly operated under the food safety and inspection regulations in force.

30. Egg products must be:

(a) Homogeneous in minimum solids matter content, colour and pH

(b) Fit for use in the production of foodstuffs

(c) Free from shell fragments and in accordance with tolerances for extraneous matter in annex I

(d) The taste, colour and odour of egg products shall be natural and characteristic of each product; dried egg products shall be easily reconstituted.

B. Purchaser-specified requirements

31. The following subsections define the requirements that can be specified by the purchaser together with the codes to be used in the UNECE coding system.

32. Additional purchaser-specified requirements, which are either not accounted for in the code (e.g. if code 9 “other” is used) or which provide additional clarification to the product or packing description, shall be agreed between buyer and seller and be documented appropriately.

1. Source materials

33. The following source materials are not permissible:

(a) Egg products obtained from broken eggs (with damaged shell and membrane)

(b) Egg content separated from its shell by means of centrifugal separation.

Source material code (data field 2)	**Category/description**
0	Not specified
1	Class A eggs
2	Class B eggs
3	Class B eggs with cracked shells but undamaged membranes
4	Egg products
5-8	Codes not used
9	Other

2. Product type

Product code (data field 3)	**Category/description**
00	Not specified
01	Liquid whole egg
02	Concentrated whole egg
03	Dried whole egg in powder form
04	Granulated dried whole egg
05-09	Codes not used
10	Liquid blended egg product
11	Concentrated blended egg product
12	Dried blended egg product in powder form
13	Granulated dried blended egg product
14-19	Codes not used
20	Liquid yolk
21	Dried yolk in powder form
22	Granulated dried yolk
23-29	Codes not used
30	Liquid egg albumen
31	Concentrated egg albumen
32	Spray-dried egg albumen in powder form
33	Granulated spray-dried egg albumen
34	Pan-dried egg albumen in powder form
35	Granulated pan-dried egg albumen
36-98	Codes not used
99	Other

3. Physical and chemical indicators of conventional egg products

34. Liquid, frozen or dried egg products from whole eggs, egg yolks and egg albumen obtained using conventional technologies and not special procedures designed to change the product's properties and/or composition shall meet the requirements set out in the table in annex I. Any method of analyses used must be internationally approved, for example by the Association of Official Analytical Chemists (AOAC)[4]. The percentage expression of the weight ratio of the components of the egg product shall be established with regard to the egg part only of the given product. Quality parameters and testing methods different from those in annex II can be agreed between the buyer and the seller.

[4] Association of Official Analytical Chemists (AOAC). Official Methods of Analysis, 18th edition. Revision 2, 2007 (updates can be found at: www.aoac.org).

4. Processing of egg products

35. Egg products shall be processed in accordance with the Joint FAO/WHO Codex Alimentarius Commission Code of Hygienic Practice for Eggs and Egg Products. The egg products must be treated in an establishment approved by the relevant official agency having jurisdiction.

(a) Pasteurization

36. The results of pasteurization processes shall be verified using proper testing procedures.

Pasteurization code (data field 4)	**Category/description**
0	Not specified
1	Pasteurization
2-8	Codes not used
9	Other

(b) Special procedures

37. To modify egg products and/or enhance their positive characteristics, special procedures may be used, in accordance with good manufacturing practice, including fermentation, stabilization (desugaring) and regulation of acidity (acidification). Application of such procedures must be permitted for use by the importing country.

(i) Fermentation

Fermentation code (data field 5)	**Category/description**
0	Not specified
1	Fermentation
2-8	Codes not used
9	Other

(ii) Stabilization (desugaring)

Stabilization code (data field 6)	**Category/description**
0	Not specified
1	Stabilization
2-8	Codes not used
9	Other

(iii) Regulation of acidity (acidification)

Regulation of acidity (acidification) code (data field 7)	**Category/description**
0	Not specified
1	Regulation of acidity (acidification)
2-8	Codes not used
9	Other

(iv) Heat treatment of egg albumen

Code for heat treatment of egg albumen (data field 8)	**Category/description**
0	Not specified
1	Heat treatment of egg albumen
2-8	Codes not used
9	Other

(v) Ionizing radiation[5]

Ionizing radiation code (data field 9)	**Category/description**
0	Not specified
1	Ionizing radiation
2-8	Codes not used
9	Other

(vi) UV radiation[5]

UV radiation code (data field 10)	**Category/description**
0	Not specified
1	UV radiation
2-8	Codes not used
9	Other

5. Microbiological criteria

38. In addition to any national requirements, the microbiological condition of egg products shall be in conformity with the Codex Code of Hygienic Practice for Eggs and Egg Products.

[5] Egg products and/or additives processed with ionizing or UV-radiation are supplied in accordance with legislation in force in the importing country. In the case of fermented products, these indicators are registered prior to the fermentation process.

6. Provisions concerning contaminants

39. Egg products shall not contain any contaminants in amounts greater than those specified in the residue-monitoring legislation of the importing country.

7. Provisions concerning hygiene

40. The hygiene requirements for the manufacture of egg products and the premises, equipment and personnel manufacturing or participating in their manufacture should be as specified in the Codex Code of Hygienic Practice for Eggs and Egg Products.

41. In addition, egg products shall satisfy the appropriate tests specified in chapter IV of the present standard.

8. Product history

(a) Traceability

42. The requirements concerning production history by the specified purchaser require that a Hazard Analysis and Critical Control Point (HACCP) programme, including traceability systems, be in place. Traceability requires a verifiable method for identifying products or commodity lots at all relevant stages of production. Traceability records must be able to substantiate the claims being made, and the procedures used to certify conformity must be in accordance with the provisions concerning conformity-assessment requirements of chapter II, section B.11.

(b) Refrigeration

43. The purchaser may specify the use of refrigeration for egg products, which must be consistent with the legislation of the importing country. Where no such legislation exists, the legislation of the exporting country shall be used.

Refrigeration code (data field 11)	**Category**	**Description**
0	Not specified	
1	Chilled	Internal product temperature maintained at ≥ 0° and ≤ +4° C at all times following packing and subsequent refrigeration
2	Frozen	Internal product temperature maintained at ≤ -12° C at all times following packing and subsequent freezing
3	Deep-frozen	Internal product temperature maintained at ≤ -18° C at all times following freezing
4-8	Codes not used	
9	Other	Can be used to describe any other refrigeration agreed between buyer and seller

(c) Functional properties

44. The purchaser may specify functional properties for the egg product which shall be consistent with the legislation of the importing country. In the absence of such legislation, the functional properties of egg products shall be agreed between buyer and seller.

Functional properties code (data field 12)	**Category/description**
0	Not specified
1	Conventional (natural)
2	Enhanced foamability
3	Enhanced emulsification
4	Enhanced gelatinization
5-8	Codes not used
9	Can be used to describe any other enhanced function agreed between buyer and seller

(d) Use of additives and ingredients

45. The purchaser may specify the introduction of additives into the egg product, which shall be consistent with the legislation of the importing country. In the absence of any such legislation, the use of additives shall be agreed between buyer and seller.

Additive code (data field 13)	**Category/description**
00	Not specified
01	Food additive(s)
02-09	Codes not used
10	Added food ingredient(s)
11-19	Codes not used
20	Added salt
21-29	Codes not used
30	Added sugar
31-39	Codes not used
40	Food additive(s) and added food ingredient(s)
41	Food additive(s) and added salt
42	Food additive(s) and added sugar
43	Food additive(s), added food ingredient(s) and salt
44	Food additive(s), added food ingredient(s) and sugar
45-49	Codes not used
50	Added food ingredient(s) and salt
51	Added food ingredient(s) and sugar
52-98	Codes not used
99	Can be used to describe any other additives agreed between buyer and seller

9. Quality level

46. A quality level for egg products can be specified as follows:

Quality code (data field 14)	**Category**	**Description**
0	Not specified	Must meet the minimum requirements set out in chapter II, section A
1	UNECE quality level	Product meets UNECE quality level
2-8	Codes not used	
9	Other	Other quality level or system agreed between buyer and seller

10. Provisions concerning labelling

(a) Labelling of packages

47. Labelling of packages should conform to the corresponding provisions of the Codex Code of Hygienic Practice for Eggs and Egg Products[6]. Packages containing egg products shall bear the following particulars, as appropriate, in characters which are conspicuous, clearly legible and indelible:

(a) Product description:

- Liquid whole egg
- Frozen whole egg
- Dried whole egg (powder or granules)
- Liquid egg yolk
- Frozen egg yolk
- Dried egg yolk (powder or granules)
- Liquid egg albumen
- Frozen egg albumen
- Pan-dried egg albumen (powder or granules)
- Spray-dried egg albumen (powder or granules)
- Liquid blended egg
- Frozen blended egg
- Dried blended egg (powder or granules)
- Concentrated whole egg
- Concentrated egg albumen

[6] The Code refers to the Codex General Standard for the Labelling of Prepacked Foods, CODEX STAN 1-1985. Revised 1991. Amended 1999.

(b) Indications:

- The indication “heat-treated” where the egg albumen has been heat-treated
- The indication “stabilized” where the product has been desugared
- The indication “acidified” where the product has been so treated

(c) When products are marketed as UNECE quality, they must bear the marking “UNECE quality”

(d) A list of ingredients, including water and food additives present, in descending order by weight

(e) Name, or trade mark, and address of manufacturer, and/or of packer, distributor, exporter, importer

(f) Identification number of the egg product processing establishment and commodity lot number, each lot being allocated a sequential number

(g) Country of origin of the eggs and the egg product

(h) Net weight in either SI (*Système international*) units, or avoirdupois

(i) Date of manufacture or “use-by date”

(j) Consignments of egg products, destined not for retail but for use as an ingredient in the manufacture of another product, must have a label giving the temperature at which the egg products must be maintained and the period during which conservation may thus be assured

(k) For liquid egg, the label must also bear the words “non-pasteurised liquid egg - to be treated at place of destination” and indicate the date and hour of breaking.

48. Packages containing egg products shall be labelled in accordance with the importing country legislation.

(b) Labelling of bulk containers

49. Where liquid egg products are marketed in a tanker churn or other suitable bulk container, the information specified in (a) to (e) and in (h) above may be provided in accompanying documents. The information provided for in (f) and in (i), (j) and (k), however, must appear on the container.

11. Provisions concerning conformity-assessment requirements

50. The purchaser may request third-party conformity assessment of specified requirements. In such cases, the name of the third-party certifying authority and the assessment requirements that will be used must be agreed upon by the buyer and seller.

51. The third-party certification authority will provide a written report to the contractor that states assessment observations for each agreed element.

52. The assessment may be limited in scope or it may be comprehensive to assess conformance to the requirements identified in this standard or other specified standards.

Conformity-assessment code (data field 15)	**Category**
0	Not specified
1	Specified standard
2	Specified standard element(s)
3	Specified combined standard elements
4-8	Codes not used
9	Other

12. Provisions concerning packaging, storage and transport

53. Packaging, storage and transport should conform to the corresponding provisions of the Codex Code of Hygienic Practice for Eggs and Egg Products.

54. Egg products shall be packed in such a manner as to protect them adequately, in accordance with the relevant requirements, and to also prevent contamination. The packaging material shall not impart any extraneous taste, odour or colour to the egg products and shall be in accordance with legislation of the importing country.

55. Storage conditions prior to dispatch and the equipment used for transport shall be appropriate to the physical condition of the egg products and shall be in accordance with the requirements of the importing country. Attention is drawn to the provisions of the UNECE Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for Such Carriage (<www.unece.org/trans/main/wp11/atp.html>).

(a) Pack weight

56. A “pack” is a specific quantity of egg product. Its weight shall be indicated as net weight. The definition of the net weight and its application and verification must be agreed between buyer and seller according to the table below:

Pack weight code (data field P1)	**Category/description**
0	Not indicated
1	Net weight specified
2-8	Codes not used
9	Other

(b) Primary packaging

57. The primary packaging is in direct contact with the product and is used to segregate the product into individual consumer or bulk units. The following types of primary packaging may be specified:

Primary packaging code (data field P2)	**Category/description**
00	Not specified
01	Plastic bag
02	Metal can
03	Metal churn (agitation provided)
04	Metal canister/container
05	Metal tank
06	Metal container
07	Plastic pail
08	Plastic canister
09	Plastic barrel
10-98	Codes not used
99	Other

(c) Labelling of the primary packaging

58. Labelling of the primary package may be specified as follows:

Labelling code (data field P3)	**Category/description**
0	Not specified
1	Consumer labels must be in accordance with the requirements of the importing country
2	Not labelled
3-9	Codes not used

(d) Primary package weight

59. The weight of the primary package is equal to the net weight of the product it contains. The definition of the net weight and its application and verification must be agreed between buyer and seller.

Primary package weight code (data field P4)	**Category/description**
0	Not specified
1	Net weight specified
2-8	Codes not used
9	Other

(e) Secondary packaging

60. Secondary packaging is used to protect and identify the product during transport. Secondary packages consist of one or more primary packages and must be labelled in accordance with the requirements of the importing country. The following types of secondary packaging may be specified:

Secondary packaging code (data field P5)	Category
0	Not specified
1	Multiwall (laminated multi-layer) paper sack
2	Plastic box
3	Corrugated-paper box
4-8	Codes not used
9	Other

(f) Secondary package weight

61. Secondary package (packaging for transport) weight is expressed as five digits with one decimal place (0000.0 kg). Secondary package weight tolerances and weight ranges are determined by buyer and seller.

Secondary package weight code (data field P6)	Category/description
00000	Not specified
00001 - 99999	Five-digit weight in kilograms (0000.0 kg) specified

(g) Egg product packaging and packing coding format

62. The following table shows the general application of the coding format for describing packaging and packing for egg products:

Data field	Description	Chapter	Code range
P1	Pack weight	II.B.12 (a)	0-9
P2	Primary packaging	II.B.12 (b)	00-99
P3	Primary package labelling	II.B.12 (c)	0-9
P4	Primary package weight	II.B.12 (d)	0-9
P5	Secondary packaging	II.B.12 (e)	0-9
P6	Secondary package weight	II.B.12 (f)	00000-99999

III. UNECE CODE FOR PURCHASER REQUIREMENTS FOR EGG PRODUCTS

A. Definition of the code

63. The UNECE code for purchaser requirements for egg products has 17 fields and 20 digits (2 digits unused) and is a combination of the codes defined in chapter II, section B.

No.	Name	Chapter	Code range
1	Egg product	I.A	00-99
2	Source material	II.B.1	0-9
3	Product type	II.B.2	00-99
4	Pasteurization	II.B.4 (a)	0-9
5	Fermentation	II.B.4 (b) (i)	0-9
6	Stabilization (desugaring)	II.B.4 (b) (ii)	0-9
7	Regulation of acidity (acidification)	II.B.4 (b) (iii)	0-9
8	Heat treatment of egg albumen	II.B.4 (b) (iv)	0-9

No.	Name	Chapter	Code range
9	Ionizing radiation	II.B.4 (b) (v)	0-9
10	UV radiation	II.B.4 (b) (vi)	0-9
11	Refrigeration	II.B.8 (b)	0-9
12	Functional properties	II.B.8 (c)	0-9
13	Use of additives and ingredients	II.B.8 (d)	00-99
14	Quality level	II.B.9	0-9
15	Field not used	-	0-9
16	Field not used	-	0-9
17	Conformity assessment	II.B.11	0-9

B. Example

64. The following table describes a dried whole egg product in powder form, manufactured from Class B hen eggs. The product is pasteurized and stabilized through fermentation. It is produced without acidification, temperature control or ionizing or UV radiation and has no additives. The product has conventional functional properties and meets the UNECE quality level. It is not refrigerated during the period following packing. Conformity with the specified standard should be certified by the company nominated by the purchaser.

65. This item has the following UNECE egg product code:

90 2 03 1 1 1 0 0 0 0 0 1 00 1 0 0 1.

Data field No.	Name	Requirement	Code value
1	Egg product	Egg product	90
2	Source material	Class B hen eggs	2
3	Product type	Dried whole egg in powder form	03
4	Pasteurization	Pasteurized	1
5	Fermentation	Fermented	1
6	Stabilization (desugaring)	Stabilized	1
7	Regulation of acidity (acidification)	Not acidified	0
8	Heat treatment of egg albumen	Not heat treated	0
9	Ionizing radiation	Not treated with ionizing radiation	0
10	UV radiation	Not treated with UV radiation	0
11	Refrigeration	Not refrigerated	0
12	Functional properties	Conventional (natural)	1
13	Use of additives and ingredients	Without additives	00
14	Quality level	UNECE quality level	1
15	Field not used	-	0
16	Field not used	-	0
17	Conformity assessment	Quality assessment according to specified standard	1

IV. PROVISIONS CONCERNING METHODS OF ANALYSIS

66. Analysis and sampling methods are set forth in annex I. Other methods and means that ensure accurate results may be used if they meet the requirements of this standard.

67. Pasteurization of egg products shall be determined by an appropriate test. Where the alpha-amylase test is used, it should be performed as specified in the Codex Code of Hygienic Practice for Eggs and Egg Product

Annex I

PHYSICAL AND CHEMICAL INDICATORS OF CONVENTIONAL EGG PRODUCTS

	Product						
	Whole egg		Egg yolk		Albumen		
	Liquid and frozen	Dried	Liquid and frozen	Dried	Liquid and frozen	Dried	
						Pan-drying	Spray-drying
1	2	3	4	5	6	7	8
Minimum solids matter content (%)	22.0	95.0	40.0	95.0	10.5	84.0	92.0
Minimum fat content (%)	9.8	39.0	25.0	55.0	0.05[7]	0.5[7]	
Minimum protein content (%)	10.5	45.0	15.0	33.0	10.0	71.0	75.0
Extraneous matter	No particles over 1 mm in 100 g and should not exceed 100 mg/kg	Same	Same	Same	Same	Same	
Minimum concentration of hydrogen ions (pH)	7.0	7.5	5.9	6.0	8.5	4.0	
Maximum beta-hydroxybutyric acid[8] (mg/kg)	10	10	10	10	10	10	
Maximum lactic acid (mg/kg)	1 000	-	1 000	-	1 000	-	
Maximum succinic acid (mg/kg)[9]	25		25		25		

Note: For dried egg products, the weight ratio of fat and egg albumen matter is calculated as solids matter.

[7] Method: Gerber extraction.

[8] Lactic acid (used only for processing), succinic and beta-hydroxybutyric acid are considered to be solids matter. Eggshell, membrane and other particles in egg products should not exceed 100 mg/kg of egg product.

[Solids matter content may need to be changed to dry matter content. Solids matter could be interpreted as materials that could be filtered from liquid eggs and the retentate is reported as solids matter. When only moisture is removed from liquid eggs, the dry residue will be the dry matter. Since the liquid eggs are without any solids suspended within, this dried liquid eggs should be reported as dry matter.]

[9] Limit of succinic acid must be in, to prevent use of hatcheries rejects in food grade egg products for food industry: this is a quality parameter [DELETE THIS FOOTNOTE BEFORE ADOPTION/PUBLICATION].

Annex II

METHODS OF ANALYSIS AND SAMPLING

I. Preparation of the sample

A General

1. Samples must be collected in an asceptic manner from homogeneous products. When practical, sealed primary containers should be collected and properly submitted to the laboratory for analyses. Storage of samples awaiting shipment to a laboratory must be under conditions appropriate for the type of product.

2. The sample must be made homogeneous prior to analysis and kept in a hermetically sealed jar in a cool place.

3. For all frozen samples, the sample is allowed to thaw, or is warmed in a water bath of temperature less than 50° C, homogenized and treated as for liquid samples in all analyses.

4. For all dried samples, the sample is prepared for analysis by being passed three times through a sieve with a mesh of approximately 1 mm^2 to thoroughly break up any lumps.

B. Analysis

5. Samples must be analysed for:

- Dry matter (Total solids)
- Total fat content
- Alpha-amylase assay
- pH (hydrogen ion concentration)
- Beta-hydroxybutyric acid

6. The methods of analysis used must be the latest approved methods by the Association of Official Analytical Chemists or by the Codex Code of Hygienic Practices for Egg Products.

7. The precision and accuracy of measurement and analytical equipment/methods must meet the International Standards Organization (ISO) 5725-5:1998.

8. Correctness testing (including repeatability of test results, calibration and use of standards) must meet ISO17025:2005.

C. Expression of results

9. The result shall not contain more significant figures than are justified by the precision of the method of analysis used.

D. Test report

10. The test report shall contain all the information necessary for the complete identification of the sample.

E. Repeatability

11. The difference between the results of two determinations carried out simultaneously or in rapid succession by the same analyst on the same sample shall not exceed 0.1 g dry matter per 100 g of sample.

II. Methods

Method 1: Determination of fat content

A. Field of application

12. The method allows the determination of fat in:

(a) Liquid whole egg product

(b) Liquid yolk product

(c) Frozen whole egg product

(d) Frozen yolk product

(e) Dried whole egg product

(f) Dried yolk product

(g) Liquid blended/concentrated egg product

(h) Frozen blended/concentrated egg product

(i) Dried blended/concentrated egg product.

B. Definition

13. Fat content of egg products: the fat content as determined by the method specified below.

C. Principle

14. The sample is hydrolysed by hydrochloric acid and the fat released is extracted by petroleum ether, recovered and calculated as a percentage by weight of the original sample.

15. Samples containing added salt and sugar are further extracted using a Soxhlet extraction of the acid hydrolysis residues.

D. Reagents

(a) Hydrochloric acid, concentrated (assay 36.5-38% HC1)

(b) Diethyl ether

(c) Petroleum ether, with any boiling range between 30 and 60^{o} C.

E. Apparatus

(a) Mojonnier extraction tube

(b) Water bath capable of being thermostatically controlled over the range 70-100^{o} C

(c) Oven capable of being thermostatically controlled at 100 ± 1^{o} C

(d) Soxhlet apparatus with suitable thimbles

(e) Analytical balance.

F. Procedure

16. Accurately weigh approximately 2 g liquid or frozen yolk product, 3 g of liquid or frozen whole egg product or 1 g dried yolk or whole egg product into a Mojonnier fat-extraction tube. Slowly add while vigorously shaking 10 ml of hydrochloric acid and, in the case of dried products, about 2 ml water, washing down any egg particles adhering to the sides of the tube.

17. Put the tube with sample in water bath set at 70^{o} C, bring to a boil and continue heating at boiling point for 30 minutes. Carefully shake the tube every 5 minutes during this time. After 30 minutes remove the tube, add water to nearly fill the lower bulb of the tube and cool to room temperature.

18. Add 25 ml of diethyl ether to the tube containing the sample and mix. Then add 25 ml of petroleum ether, mix and allow to stand until the solvent layer has cleared.

19. Draw off as much as possible of the ether-fat solution into a previously weighed flask containing anti-bumping granules. Before weighing the flask, dry it and a similar flask as counterpoise in an oven at 100^{o} C and allow to stand in air until constant weight is obtained.

20. Re-extract the liquid remaining in the tube twice, using 15 ml of ether each time. Thoroughly shake on each addition of ether. Allow solutions to clear and draw off ether-fat solution into flask as previously.

21. Slowly evaporate the ether from the flask by carefully placing on a boiling water bath. Dry the fat by placing the flask in the oven at 100^{o} C until constant weight is reached (probably after about 90 mins.). Remove flask and counterpoise from the oven and allow to cool to constant weight at ambient temperature (note: owing to the size of the flask and the nature of the material under test, there is less error by cooling in air than by cooling in a desiccator). Correct the weight obtained by a blank determination on the reagents used.

G. Expression of results

(a) Formula and method of calculation

22. Fat content, as a percentage by mass of the sample, is given by:

m_1/m_o x 100, where:

m_o is the mass, in g, of the fat obtained after extraction and blank correction,

m_1 is the mass, in g, of the test portion of the egg product sample.

(b) Repeatability

23. The difference between the results of two determinations carried out simultaneously or in rapid succession by the same analyst on the same sample shall not exceed 0.3 g fat per 100 g of sample.

H. Notes

24. The fat content of an egg product containing salt and sugar is obtained using the above procedure, except that the fat is further extracted from the acid solution obtained after the third extraction by the following procedure:

(a) Filter the aqueous layer remaining after extraction through a filter paper and wash filter paper with hot water until the washings do not affect the colour of blue litmus paper. Place the filter paper on a watch glass or Petri dish and dry for 1 hour in an oven at 100^o C. Allow to cool and then insert into an extraction thimble of a Soxhlet apparatus using tongs to handle the filter paper. Remove any traces of fat from the watch glass or Petri dish with cotton wool moistened with petroleum ether extraction solvent and then place cotton wool in the thimble. Place the thimble in the extraction tube;

(b) Add extraction solvent to the Soxhlet apparatus and extract for 4 hours by placing the extraction flask in a sand bath or water bath or some such similar apparatus. After extraction, remove the solvent from the extraction flask and treat as in paragraph 21;

(c) Add the weight of fat obtained by the method described in subparagraph (b) to the weight obtained by the method described in paragraph 21 to give a corrected weight m_o, which is the mass, in g, of the fat obtained after extraction.

25. This method is the same in principle as that described in the eighteenth edition of the Official Methods of Analysis of the Association of Official Analytical Chemists, section 31.4.02.

26. The further Soxhlet extraction procedure is the same in principle as that described in the Codex Recommended Methods of Analysis and Sampling, CODEX STAN 234-1999, as amended in 2007.

Method 2: Alpha-amylase test

A. Field of application

27. The efficiency of pasteurization is determined in:

(a) Liquid whole egg product

(b) Liquid yolk product

(c) Frozen whole egg product

(d) Frozen yolk product

(e) Dried whole egg product

(f) Dried yolk product

(g) Liquid blended/concentrated egg product

(h) Frozen blended/concentrated egg product

(i) Dried blended/concentrated egg product.

B. Definition

28. Efficiency of pasteurization: the absence/presence of active alpha-amylase by the method specified below.

C. Principle

29. The presence of any active alpha-amylase (present in unpasteurized or insufficiently pasteurized egg product) is indicated by its ability to break down added starch, thereby preventing the formation of a starch-iodide complex on subsequent addition of an iodine solution.

D. Reagents, apparatus, procedure and interpretation

30. The method to be employed should be from the most recent edition of the *Official Methods of Analysis* of the Association of Official Analytical Chemists.

Method 3: Determination of extraneous matter[10]

31. In order to determine the presence of shell residues or other extraneous matter, place 100 g of the substance under examination in a graduated cylinder of 1,000-ml capacity, add distilled water up to the 1,000-ml mark, mix carefully and pass through a sieve with perforations 1 mm in diameter. After sieving there should be no residue on the sieve.

32. For dried egg products, the test should be carried out on the reconstituted product.

Method 4: Determination of lactic acid

33. AOAC Official Method 944.05, Lactic Acid in Eggs, Colorimetric Method. Association of Official Analytical Chemists, *Official Methods of Analysis* (17th ed., Rev. 2, Official Method 944.05).

Method 5: Determination of succinic acid

34. AOAC Official Method 948.14, Succinic Acid in Eggs, Ether Extraction Method. Association of Official Analytical Chemists, *Official Methods of Analysis* (17th ed., Rev. 2, Official Method 948.14).

Method 6: Determination of beta-hydroxybutyric, lactic and succinic acid

35. AOAC Official Method 970.31, Beta-Hydroxybutyric, Lactic and Succinic Acid in Eggs, Gas Chromatographic Method. Association of Official Analytical Chemists, *Official Methods of Analysis* (17th ed., Rev. 2, Official Method 970.31).

[10] This method has been tentatively accepted by the Specialized Section pending the development of a method which will detect particles of a size smaller than 1 mm.