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G.C.C STANDARDIZATION ORGANIZATION (GSO)

Final Draft

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بيض الدجاج
Chicken Eggs

Prepared By
GSO Technical Committee for standards of food and agriculture products

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Chicken Eggs

Date of Board of Directors' approval	:
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Foreword

GCC Standardization Organization (GSO) is a regional Organization which consists of the National Standards Bodies of GCC member States. One of GSO main functions is to issue Gulf Standards /Technical regulations through specialized technical committees (TCs).

GSO through the technical program of committee TC No. 5 "Gulf technical committee for standards of food and agriculture products" has updated the GSO Standard No. : 1002/2006 "Chicken Eggs ". The Draft Standard has been prepared by Sultanate Of Oman .

This standard has been approved as a Gulf (Standard / Technical Regulation) by GSO Board of Directors in its meeting No.(),held on / / H , / / G. The approved standard will replace and supersede the GSO standard No. (GSO 1002/2006).

Chicken eggs

1- Field and scope of application

this standard is concerned with the requirements and specifications of edible Chicken eggs in various types: whole, liquid, frozen, dried, and frozen – dried.

2. Complementary References

- 2.1 GSO 988 “Limits of radioactivity levels permitted in foods stuff part - 1.”
- 2.2 GSO 21 “Hygienic regulation for food plants and their personal.”
- 2.3 GSO 9 “Labeling of prepackaged food stuffs”.
- 2.4 GSO 150 “Expiration periods at food products- part 1’.
- 2.5 GSO 168 “Requirements of storage facilities for dry and canned foodstuffs”.
- 2.6 GSO 261 “Microbiological Methods of food examination – part 1: Preparation of samples”.
- 2.7 GSO 287 “Microbiology - general guidance on methods for the detection of salmonella”.
- 2.8 GSO 323 “General requirements for transportation and storage of chilled and frozen foods”.
- 2.9 GSO 1016 “Microbiological criteria for food stuffs – Part 1”.
- 2.10 GSO 324 “Methods or measuring the temperature or frozen foods”.
- 2.11 GSO 382 Maximum limits for pesticide residues in agricultural food products - Part 1.
- 2.12 GSO 383 Maximum limits for pesticide residues in agricultural food products - Part 2.
- 2.13 GSO ISO 4831:2010 “Microbiology – General guidance for the enumeration of coliforms – most probable number technique”.
- 2.14 GSO ISO 4832:2010 "Microbiology – “General guidance for the enumeration of coliforms – colony count technique at temperature of 30 °C”.
- 2.15 GSO CAC MRL 2 “Maximum Residue limits for veterinary drugs in food “¹
- 2.16 GSO 841 “Maximum Limits of Mycotoxins Permitted in Foods and Animal Feeds – Aflatoxins”
- 2.17 GSO CAC 193 “General Standard for contaminants & toxins in food “²
- 2.18 The standard which will be issued by GSO “Code of Hygienic Practice for Eggs and Egg Products”
- 2.19 GSO 2152 “Egg board trays “
- 2.20 Codex Standard 192 Which adopted by Gulf Committee for Food Additives.
- 2.21 GSO 839 “Food Packages - PART 1: General Requirements”

¹ The latest version issued by Codex alimentarius

²The latest version issued by Codex alimentarius

3. Definitions

3.1 Chicken Eggs:

Zygotes produced from fertilizing eggs which form a solid entity that protects the fetus where it's condition appears naturally with the crust and they are produced from laying hens for human consumption in different ways, whether directly or in the food industry.

3.2 Eggs Products:

Products that may be used as replacement for fresh eggs in recipes or as a food (e.g., omelette). They are produced from fresh eggs by either: mixing and purifying the whole egg; or separating the egg white and yolk, and then mixing and purifying each separately. The purified whole egg, white or yolk is then further processed to produce liquid, frozen or dried eggs.

3.3 Table eggs (Whole Fresh chicken eggs)

Fresh in-shell and newly produced egg which its natural characteristics have not been changed and are not processed by any methods of egg preservation. So they are not expected to contain additives. However, colours may be used for decorating, dyeing or stamping the exterior surfaces of shell eggs.

3.4 Processing eggs

The full in-shell chicken eggs, not incubated, appropriate for human consumption and free from any shell fractures. The use of eggs which have cracks is allowed if they were directly transported from production farms or packaging centers without any thermal treatment and put into manufacturing process as quickly as possible.

3.4.1 Liquid Chicken Eggs

Food product prepared under hygienic conditions from Purified, healthy, good, and clean unshelled chicken eggs, holding the actual percentage of yolks and whites of the eggs either separately or mixed and is sufficiently pasteurized to kill pathogens. It can be preserved by any of preservation processes e.g. (addition of salt).

3.4.2 Frozen Chicken Eggs

Food product prepared under hygienic conditions by freezing the liquid chicken eggs (item 3.4.1).

3.4.3 Dried Chicken Eggs (dried eggs powder)

The food product prepared under hygienic conditions from the liquid ingredients of a mature, healthy, and proper chicken eggs (item 3.4.1), dried by any of the appropriate drying methods.

3.4.4 Frozen - dried Chicken eggs (frozen - dried eggs powder)

The food product prepared under hygienic conditions from the liquid ingredients of mature chicken eggs pasteurized and dried by deep freezing.

3.5 Egg Yolks

The part of the egg that contains the highest nutrition value and it is the origin of bacterial membrane (Blastoderm) where the embryo grows. It contains the food mass that supports the growth and development of the embryo.

3.6 Egg Whites (Albumen)

The albumen surrounding the yolks covered by the egg shell. It is transparent with a mild yellow color.

3.7 Air Cell

The empty air space exists between the white and the shell at the large end of the egg.

3.8 Air Cell Depth

The distance from the top of the air cell to the bottom, when the egg is held air cell up.

3.9 Candling

Exposing the egg to a direct light bulb that passes through and lightens the egg to examine the internal components, using a light green colored filter to examine the brownish egg shell.

3.10 Haugh unit value

It is a measure of the internal quality of whole fresh eggs, calculated based on the height of the albumen and weight of the egg:

$$\text{Haugh Unit (HU)} = 100 \log (H + 7.57 - 1.7 \times w^{0.37})$$

Where:

H = height of the albumen in millimeters.

W = weight of egg in grams.

log = logarithm.

The higher the Haugh unit value, the better the quality of the egg (fresher, higher quality eggs have thicker whites) see appendix (1) "Descriptive classification of chicken eggs intended for marketing".

3.11 Marketing

Selling, handling, displaying, storage and transporting for sale.

3.12 Package

Any suitable container filled safely with eggs to facilitate the handling processes. It is manufactured from appropriate material which does not allow contamination of the product. The small container means the container that contains thirty eggs or less, while the large container contains more than thirty eggs.

3.13 Packing Center

The licensee for collecting eggs from farms and producers, to carry out a weight and descriptive gradual process, fill the eggs in small containers and send them to retailers or markets.

4. Requirements

- 4.1 Any additives used for egg products shall be according to the standard mentioned in item (2.20) for the food category No. (10.1, 10.2).
- 4.2 The microbiological limits for the egg products shall not exceed the limits set in the GSO standard mentioned in item (2.9).
- 4.3 The maximum limits of veterinary medicines residues in eggs (whether fresh or for food processing) shall be according to the standard mentioned in item (2.15)³.
- 4.4 The eggs (whether fresh or for food processing) shall not contain any radioactive materials residues.

³ According to the latest version issued by CODEX.

- 4.5 The maximum limits of pesticide residues in eggs (whether fresh or for food processing) shall be according to the GSO standards mentioned in items (2.11 and 2.12).
- 4.6 The concentration of aflatoxin contaminated on the basis of solid material in the eggs shall not exceed 10 ppm.
- 4.7 The requirements of the GSO standard mentioned in item (2.18) shall be met, in addition to the requirements set in this GSO standard for each kind of eggs.

4.8 Table eggs (Whole Fresh Chicken Eggs)

4.8.1 General requirements and classification

- 4.8.1.1 The fresh table eggs identified in item (3.3) shall not be mixed with any other type of eggs.
- 4.8.1.2 The eggs shall be classified according to the descriptive (item 4.8.1.3) and weighted grades (item 4.8.1.4) mentioned in this standard, and shall be packaged by authorized packing centers or licensed production companies depending on the availability of necessary machines for the classification process. The packing centers must record all suppliers.
- 4.8.1.3 The eggs prepared for marketing shall be classified descriptively into four grades according to the classifications motioned in appendix (1). The classification shall be written on the package:
- Class (AA) Fresh Table Eggs
 - Class (A) Fresh Table Eggs
 - Class (B) Fresh Table Eggs
 - Class (C) Eggs "to be used in food processing"
- 4.8.1.4 Eggs of Classes (AA), (A), (B) prepared for marketing, shall be classified by weight into five grades 1 to 5 as follows (The classification shall be written on the package):
- Grade 1 (very large): 70 grams and more.
 - Grade 2 (large): from 60 to less than 70 grams.
 - Grade 3 (moderate): from 50 to less than 60 grams.
 - Grade 4 (small): From 40 to less than 50 grams.
 - Grade 5 (very small): less than 40 grams.
- 4.8.1.5 Tolerance not more than 7% is allowed in classes A, B mentioned in item (4.8.1.3) for in the lower quality and less weight class eggs.
- 4.8.1.6 Eggs which are directly collected from producers or collecting center and transported to foodstuff factories to be manufactured or used in the food industry shall be exempted from descriptive grading requirements mentioned in item (4.8.1.4) provided that its descriptive grade shall not be less than class (C) mentioned in item (4.8.1.3).
- 4.8.1.7 The symbol “AA” is allowed to be used on packages that contain eggs which does not exceed three days old from the day of packaging by marketing and retail centers.

- 4.8.1.8 The descriptive grading shall be re-ranked for eggs of the class (AA), (A) or (B) which no longer hold the distinctive specifications of their class by giving them the following class (according to the qualities they reach) and that shall be done by putting new signs according to the item (4.8.1.3), also that egg can be sent directly - without re-ranking - for use in food processing industries, and shall be distinguished with label intended for use in the industry.
- 4.8.1.9 No means of treating cracked eggs shall be permitted.
- 4.8.1.10 The eggs prepared and displayed for sale in small packages shall be classified according to its weight descriptive grades.
- 4.8.1.11 The color used in egg stamping according to item (4.8.1.3), shall be authorized to be used in food and as follows:
- a- Green color for eggs which are locally produced or imported from GCC Countries, the stamp shall contain the name of the country or it's International code.
 - b- Red color for eggs imported from all other countries the stamp shall contain the name of the country or it's International code.
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- 4.8.1.12 Egg production and marketing shall be according to the rules and health requirements of egg production and as set in GSO standard mentioned in item (2.18).

4.8.2 Class (A) fresh table egg requirements

Is the egg that has not been subjected to any preserves "other than cooling" and should have the following properties:

- 4.8.2.1 Egg sinks in a solution of 10% sodium chloride by mass.
- 4.8.2.2 The Shell: shall be natural, clean and free of rough spaces and cracks and not subjected to washing or cleaning by any means and shall be durable.
- 4.8.2.3 The Yolk:
Candling shall show the contents of eggs so that:
- Yolk shadow is not specified.
 - Yolk shall be of simply rounded shape to retain its location in the center of the egg and doesn't mix easily with the albumin.
 - Yolk is not stained with any visible meat or blood spots or any albuminoidal blocks.
- 4.8.2.4 Air Cell (Air cavity): shall be stable, not exceeding a depth of 5 mm.
- 4.8.2.5 Egg white (Albumin): shall be clear and transparent with gelatinous homogeneous texture , coherent and free from any foreign substance of any kind, giving 72 Haugh unit or more.
- 4.8.2.6 Germ cell:
Its growth is not significant and cannot be extended significantly, and did not have any divisions or visible growth.
- 4.8.2.7 **pH** range from 7.6 - 9.3

4.8.3 Class (AA) Fresh table egg requirements

The same specifications requirements for eggs Grade A "fresh" are applied except that the air cell height shall not be more than 3 mm, and the Haugh units shall be 80.

4.8.4 Class (B) Fresh table egg requirements

- 4.8.4.1 The shell shall be clean, unbroken or cracked with dirt stains not exceeding 2/3 of the total area if they are clustered, and not more than 1/16 of the total area if sporadic. The shell shall have the right configuration or a normal form with the possibility of obvious presence of coarse spaces and protrusions.
- 4.8.4.2 The content of the egg shall be shown by candling so:
- The yolk shall be exactly determined and clear.
 - The yolk shall be in elliptical shape and floats in the egg when rotated.
 - The yolk shall not have stains, meat or blood spots or solid albumin which allows the growth of slight fetal.
 - The air cell shall be free with unlimited movement, or bubbly in a depth not more than 9 mm.
- 4.8.4.3 Eggs when broke shall be in the following condition:
- Limpid, odorless, of ordinary taste, the albumen shall be homogeneous and relatively weak gives 51 to 70 Haugh unit.
 - The yolk is slightly wide and flat.
 - pH ranging from 7.6 and 9.5.

4.8.5 Class (C) Fresh egg requirements intended to be used in food processing.

- 4.8.5.1 The Shell shall not be broken and the cracked eggs are allowed to be used as mentioned in item (3.4),. The area of colored stains and dirt shall not exceed ¼ of the total area.
- 4.8.5.2 The content of the egg shall be shown by candling so:
- The yolk boundaries should be clear and allows it to be flat and wide with a visible signs of little embryo growth.
 - The albumin shall be weak, watery and has blocks or small blood spots.
 - The air cell shall be free with unlimited movement, or bubbly in a depth not more than 9 mm.
- 4.8.5.3 Eggs when broken shall be in the following condition:
- With watery albumin of less than 50 Haugh unit with presence of small blood spots.
 - The yolk can mix easily with white.
 - pH ranging from 7.6 and 9.5.

4.9 Liquid egg

4.9.1 Natural requirements:

- 4.9.1.1 It shall retain the natural properties of fresh egg.
- 4.9.1.2 It shall be free from odd substances and impurities such as eggshells and shall be free from undesirable odors or any change in color.

- 4.9.1.3 It shall be prepared under hygienic condition and sufficiently pasteurized to kill all pathogens and according to GSO standard mentioned in item (2.18).
- 4.9.1.4 The Yolk & white shall retain their natural percentages either individually or mixed and their colors shall be between yellow and yellow orange.
- 4.9.1.5 It shall not be a result of retrieving the powdered egg white.

4.9.2 Chemical requirements

- 4.9.2.1 It shall be free from alpha amylase activity.
- 4.9.2.2 The proportion of the protein ($n \times 6.68$) shall not be less than 45% based on the dry mass, where n: The percentage of nitrogen.
- 4.9.2.3 Fats percentage shall not be less than 45% based on dry mass.
- 4.9.2.4 Total solids percentage shall not be less than 25% of the final mass of the product.
- 4.9.2.5 Reducing sugars percentage (glucose) shall not be more than 1.4% based on dry mass. And the reducing sugars percentage shall not be more than 0.30% based on dry mass if (glucose) extracted.
- 4.9.2.6 pH ranging not more than 8.5.
- 4.9.2.7 Chloride ratio (such as sodium chloride) shall be from 0.5% to 1.5% based on dry mass.

4.10 Frozen eggs

4.10.1 Natural requirements:

- 4.10.1.1 All natural requirements of liquid egg shall apply on frozen egg after liquefying it.
- 1.10.1.2 The frozen eggs shall be liquefied according to GSO standard mentioned in item (2.18)

4.10.2 Chemical requirements:

All chemical requirements for liquid egg shall apply on frozen egg.

4.11 Dried & Frozen-dried egg (egg powder)

4.11.1 Natural requirements

- 4.11.1.1 Items (4.9.1.2, 4.9.1.3, 4.9.1.4) shall apply on dried and frozen dried egg.
- 4.11.1.2 It shall retain the natural properties of fresh eggs when retrieved.

- 4.11.1.3 It shall be homogeneous in color between yellow, and yellow-orange and of soft texture.
- 4.11.1.4 It shall give a smooth paste when mixed with warm water of three times of its mass at 40 °C temperature.
- 4.11.1.5 It shall be free from unwanted odors.

4.11.2 Chemical requirements

- 4.11.2.1 It shall comply with all chemical requirements for liquid eggs, with an exception of items (4.9.2.1, 4.9.2.3, 4.9.2.4).
- 4.11.2.2 Moisture content shall not exceed 5% of the product mass.
- 4.11.2.3 The proportion of fatty substances shall not be less than 38% based on dry mass.
- 4.11.2.4 Melting ratio shall not be less than 85% of the final mass of the product.
- 4.11.2.5 Addition of beta-carotene or riboflavin to the egg powder shall be allowed, not exceeding 2% based on dry basis.
- 4.11.2.6 Addition of sucrose shall be allowed by one part per 2 parts of egg solids before drying (Dried eggs by sugar). Moisture content shall not exceed 3.5%. Addition of Alpha amylase enzymes shall be allowed.

5. Packaging, transportation and storage

At packaging, transport and storage, the conditions stated in GSO standard mentioned in items (2.5), (2.8), (2.18) and (2.19) shall be considered with the following:

5.1 Fresh whole table eggs

- 5.1.1 Fresh table egg shall be clean and the eggs with class (B) and class (C) could be washed prior packaging, by water mixed with 3-5 ppm iron and contains disinfectant such as chlorine to kill microbes. It shall be dried by fans and shall be sprayed or immersed in mineral oil (paraffin oil).
- 5.1.2 Fresh table egg shall be sorted prior packaging to exclude improper, cracked, and Internal defects eggs.
- 5.1.3 Selected eggs shall be packed in paperback cartons and dishes; designed specifically for eggs. Each dish shall contain 6 or 12 or 30 eggs so that the narrow end is down and the wider end is to the top.
- 5.1.4 Dishes shall be packed in sealed carton boxes, and an empty dish shall be placed on the top before closing the box.
- 5.1.5 Dishes and boxes - complied with GSO standard mentioned in item (2.19) - shall be clean, strong and made from appropriate materials and do not transfer any undesirable odors to the eggs and must be used just once only.
- 5.1.6 Transportation and distribution shall be in chilled or thermally insulated containers so that the temperature is not more than 10°C.

5.2 liquid, frozen, dried and frozen-dried chicken eggs

- 5.2.1 Liquid, frozen, and dried eggs shall be packed in tightly clean, solid sealed containers made from carton lined with plastic layer or any other appropriate healthy material so

that it does not result any physical or chemical properties of the eggs will not be affected.

- 5.2.2 Packages requirements shall meet hygienic requirements of food product containers and shall be free from any undesirable odors.
- 5.2.3 Liquid, frozen, dried and frozen-dried eggs shall be packed under vacuum or in presence of Nobel gas such as (nitrogen or nitrogen and carbon dioxide).
- 5.2.4 Liquid eggs shall be stored at a temperature of not more than 5° C for a period of not more than 5 days and dried while frozen-dried eggs shall be stored at a temperature of not more than (10 ° C) and for 6 months in maximum, and frozen eggs shall be stored at a temperature of (-18 °C) and for a period not exceeding six months.
- 5.2.5 During transportation & distribution, temperature shall not exceed 5 °C for liquid eggs, (-18 °C) for frozen eggs and 10 °C for dried and frozen – dried eggs.

6. Labeling

without prejudice to the requirements specified in the GSO standards mentioned in items (2.3 and 2.4). the following shall be declared on the label:

6.1 For whole fresh table eggs:

The following data shall appear on small egg containers– with cover even if these containers are inside other large containers :

- 6.1.1 Non-symbolic production date and expiration date, (day-month- year).
- 6.1.2 Number of eggs.
- 6.1.3 Class (quality grade (AA, A, B, C): weight), shall be written according to the requirements of item (4.8) are applied.
- 6.1.4 Name and address of the Packing center or the production farm.
- 6.1.5 Storage conditions.
- 6.1.6 All imported eggs shall be stamped to distinguish them from local production.
- 6.1.7 Non-symbolic production date and expiration date, (day-month- year).

6.2 Liquid, frozen, dried and frozen-dried eggs:

The following data shall appear on small egg containers– with cover even if these containers are inside other large containers:

- 6.2.1 Non-symbolic production date and expiration date, (day-month- year) depending on storage temperature.
- 6.2.2 In case of glucose extraction, the product name must be followed by a statement of (glucose free).
- 6.2.3 Storage conditions.
- 6.2.4 Perpetration method for use.
- 6.2.5 The names and amounts of any optional permitted ingredients.

Appendix (1)

"Descriptive classification of chicken eggs intended for marketing"

Classification	shell	white	Yolk	Haugh Unite	Air Cell	pH
Fresh table eggs (AA)	Natural, clean, free of spaces and cracks, not washed	Serene, transparent, Gelatinous, homogenous and cohesive texture, free from foreign materials.	Unspecified, round in shape and retains its place in the center of the egg and does not mixed easily with albumin	≥ 80	Not more than 3 mm in depth	7.6 – 9.3
Fresh table eggs (A)	Natural, clean, free of spaces and cracks, not washed	Serene, transparent, Gelatinous, homogenous and cohesive texture, free from foreign materials.	There is no visible stains , no bloody meat , or solid albumen blocks.	≥ 71	Immobile, does not exceed 5 mm in depth at the wider part of the egg.	7.6 – 9.5
Fresh table eggs (B)	Clean, not broken or cracked, clustered dirt stains not more than 1/32 of total area, and not more than 1/ 16 of the area if scattered. There are possibilities of clear rough burrs sides.	Serene, odorless, homogeneous but relatively weak, with normal taste.	Specific and clear, floating and elliptical shape , free of stains or meat blocks and blood stains or fossilized albumin, a slight white growths are allowed.	51 - 70	free movement, with bubbles, not more than 9 mm in depth.	7.6 – 9.5
Eggs for Processing (C)	not broken , colored spots and dirt not more than	weak Albumin, watery, with small blood spots or	yolk borders are clear, and allowed to be wide and flat,	≤ 50	free movement, with bubbles, may	undefined

	1/4 of total area	blocks.	with signs of a slight white growths, blends easily with albumin.		exceed 9 mm in depth.	
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