TURKISH STANDARTS

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PROCESSED HAZELNUT KERNELS

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0- Subject, Definition, Scope

0.1. Subject Matter

This standard refers to the definition, classification, characteristics, sampling, inspection, tests and delivering to market of the processed hazelnut kernels.

0.2. Definitions

0.2.1. Processed Hazelnut Kernels
Processed hazelnut kernels (*Corylus avellana* L and *Corylus maxima* Mill.) (TS 3075)[1]) are products made by blanching, roasting, chopping, slicing or processed in any other way.

0.2.1.1. Blanched Hazelnut Kernels
Blanched hazelnut kernels are products, which are blanched by removal of skin from the kernels and partly blanched kernels are excluded.

0.2.1.2. Roasted Hazelnut Kernels
Roasted hazelnut kernels are products, which are roasted and skin is removed, and partly roasted kernels are excluded.

0.2.1.3. Blanched Hazelnut Kernels (as is)
Blanched hazelnut kernels (as is) are products, which are blanched by removal of skin from the kernels and partly blanched kernels are not excluded.

0.2.1.4. Roasted Hazelnut Kernels (as is)
Roasted hazelnut kernels (as is) are products, which are roasted and skin is removed, and partly roasted kernels are not excluded.

0.2.1.5. Partly Blanched Hazelnut Kernels
Partly blanched hazelnut kernels are products, which are made from partly blanched and unblanched kernels after blanching process.

0.2.1.6. Partly Roasted Hazelnut Kernels
Partly roasted hazelnut kernels are products, which are made from partly blanched and unblanched kernels after roasting process.

0.2.1.7. Diced Hazelnut Kernels
Diced hazelnut kernels are products, which are made by chopping the kernels following proper techniques.

0.2.1.8. Defected Blanched Hazelnut Kernels (as is)
Defected blanched hazelnut kernels (as is) are products, which are made by mixture of one or more blanched defected kernels including shrunken, shriveled, tumorous, mechanically damaged, broken, crushed and twin kernels, and partly blanched kernels are not excluded.

0.2.1.9. Defected Roasted Hazelnut Kernels (as is)
Defected roasted hazelnut kernels (as is) are products, which are made by mixture of one or more roasted defected kernels including shrunken, shriveled, tumorous, mechanically damaged, broken, crushed and twin kernels, and partly roasted kernels are not excluded.

0.2.1.10. Defected Diced Hazelnut Kernels (as is)
Defected diced hazelnut kernels (as is) are products, which are made by chopping the mixture of one or more diced defected kernels including shrunken, shriveled, tumorous, mechanically damaged, broken, crushed and twin kernels following proper techniques.

0.2.2. Defects
0.2.2.1.Shrunken or Shrivelled
Shrunken or shrivelled kernels are tiny, wrinkled and have deformed shape.

0.2.2.2. Tumorous
Tumorous is formation of hard tumor or tumor like symptoms on kernels in response to insect damage.

0.2.2.3. Yellowish
Yellowish is formation of partial or full discoloration on kernels, but the taste has not changed or just started to change.

0.2.2.4. Rancid
Rancidity is a change in taste of kernels and development of rancid taste.

0.2.2.5. Rotten
Rotten is a partially or fully loss of color, taste and other characteristics of kernel by rotting.

0.2.2.6. Mouldy
Mouldy is a formation of mould on the kernels.

0.2.2.7. Hidden Rot
Hidden rot is a formation of rot in the kernel, which does not reach the outer surface.

0.2.2.8. Hidden Mould
Hidden mould is a formation of mould in the central cavity of kernel, which does not reach the outer surface.

0.2.2.9. Rancid Yellowish
Rancid lemony is a formation of discoloration and change in taste, which gives off flavor and sour taste due to oxidization of oil in the kernel.

0.2.2.10. Insect damaged
Insect damaged is a formation damage on the kernel by insects.

0.2.2.11. Mechanically damaged
Mechanically damage is a formation of physical injury during shelling the hazelnuts and formation of a wound on kernel larger than 2mm in diameter and 1mm in depth.

0.2.2.12. Broken

Broken is a loss of a piece of kernel larger than one-third its size, but the kernel is large enough to retain on 5mm sized screen.

0.2.2.13 Crushed

Crushed is a change in shape due to physical pressure or other causes.

0.2.2.14. Twin

Twin is a formation of two kernels in one seed.

0.2.3. Foreign Matter

Foreign matters are any substances other than the hazelnut kernels or its portions.

0.2.4. Crop Year

Crop year is the year in which the hazelnuts used for production are harvested.

0.2.4.1.New Crop

New crop is hazelnuts harvested in the recent crop year.

0.2.4.2.Old Crop

Old crop is hazelnuts harvested earlier one or more years than the recent crop year.

0.3. Scope

This standard is about the processed hazelnut kernels, and does not cover the diced under screened kernels of secondary products.

1. CLASSIFICATION AND CHARACTERISTICS

1.1. Classification

1.1.1. Groups

- Processed hazelnut kernels are grouped based on their shapes;
    - Round hazelnut kernels
    - Pointed hazelnut kernels

1.1.2. Classes

- Processed hazelnut kernels are divided into two groups based on the use of sound or damaged kernels in processing;
    - Class I
    - Class II

1.1.2.1.

- Blanched and roasted hazelnut kernels in class I are classified according to TS (Turkish Standarda)# 3075. These are;
    - I/ Extra
    - I/ Class I
    - I/ Class II

1.1.3. Types

1.1.3.1.

- Processed hazelnut kernels in class I are divided into the following groups based on processing methods;
    - Blanched
    - Roasted
    - Blanched (as is)
    - Roasted (as is)
    - Partly blanched
    - Partly roasted
    - Salted or roasted in oil
    - Diced
    - Cubic
    - Sliced

1.1.3.2.

- Processed hazelnut kernels in class II are divided into the following types based on processing methods;
    - Blanched (as is)
    - Roasted (as is)
    - Diced
    - Sliced

1.1.4. – Sizes

1.1.4.1.

- The sizes of I/ Extra and I/ Class I, in the first class should be appropriate to TS #3075.

1.1.4.2.

- Sizing is not required for the hazelnut kernels I/ Class II of Class I and II.

1.1.4.3.

- Diced hazelnut kernels can be produced in any size between 2-12,5 mm in diameter.

1.2. PROPERTIES

1.2.1. General Properties

1.2.1.1.

- CHARACTERISTICS OF SENSE

Processed Hazelnut Kernels;

- Should be in a characteristic appearance and taste.
- Should not have visible damage of any insects.
- Should not have symptoms of mould and rot.
- Should not have rancidity, off smell and taste.
- Should not include living or non-living insects or their remains.
- Should have foreign matter not more %0.05 (m/m)t.

1.2.1.2.

- Chemical Properties

The chemical properties of processed hazelnut kernels should be according to the values given in table – 1.

TABLE 1 – The Chemical Properties of Processed Hazelnut Kernels

PROPERTIES	LIMITS (at most)
Humidity	
- in blanched or any other types made from blanched kernels	% 5 (m/m)
- in roasted or any other types made from roasted kernels	% 3 (m/m)
Aflatoxin B_1	5 ppb
Aflatoxin $B_1+B_2+G_1+G_2$	10 ppb

1.2.1.3.

- Microbiological Properties

The microbiological properties of processed hazelnut kernels should be according to the values given in table – 2.

PROPERTIES	LIMITS
Total mesophylic (aerobic) bacterial count	2000 pc/g at most
Yeast and Mould	50 pc/g at most
Coliforms	10 pc/g at most
E. Koli	0
Salmonella	0
Staph. Aureus	0

1.2.1.4.

- Radioactivity

Should not exceed the values given [2)].

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2) Values defined by authorized organizations.

1.2.2.

- Group Properties

1.2.2.1.

- Round Hazelnut Kernels

The diameter of the round hazelnut kernels should be nearly equal to its length and in a round shape.

1.2.2.2.

- Pointed Hazelnut Kernels

The length of the pointed hazelnut kernels should be longer than its diameter and in a pointed shape.

1.2.3.

- Class Properties

1.2.3.1. Class I Processed Hazelnut Kernels

Class I processed hazelnut kernels should be prepared from sound hazelnut kernels and their chemical properties should be as in table – 3.

1.2.3.1.1. – I/Extra Class Processed Hazelnut Kernels (blanched and roasted)

I/Extra class hazelnut kernels should be prepared from extra kernels and tolerances for defects should be as in table – 4.

1.2.3.1.2. – I/Class I processed hazelnut kernels (blanched and roasted)
I/Class I processed hazelnut kernels should be prepared from Class I hazelnut kernels and tolerances for defects should be as in table – 4.

1.2.3.1.3. - I/Class II processed hazelnut kernels (blanched and roasted)
I/Class II processed hazelnut kernels should be prepared from Class II hazelnut kernels and tolerances for defects should be as in table – 4.

1.2.3.2. – Class II Processed Hazelnut Kernels
Class II processed hazelnut kernels, should be prepared from the mixture of one or more hazelnut kernels of as shrunken, shriveled, tumorous, mechanically damaged, broken, crushed, and twin kernels, and their chemical properties should be as in table – 4.

TABLE 3 – The Chemical Properties of Processed Hazelnut Kernels according to their Classes

PROPERTIES	LIMITS	
	Class I (at most)	Class II (at most)
Free fatty acids (As oleic acid in extracted oil)		
- New Crop	% 1,0 (m/m)	% 1,3 (m/m)
- Old Crop	% 1,4 (m/m)	% 1,5 (m/m)
Peroxide counts (in extracted oil)		
- New Crop	7 m.eq val g/kg	8 m.eq val g/kg
- Old Crop	9 m.eq val g/kg	10 m.eq val g/kg

1.2.4. Type Properties

1.2.4.1. Types belonging to Class I

1.2.4.1.1. Blanched Hazelnut Kernels
The tolerances for defects of blanched hazelnut kernels should be as in table – 4.

1.2.4.1.2. Roasted Hazelnut Kernels
Roasted kernels, should not give a burnt taste and smell and tolerances for defects should be as in table – 4.

1.2.4.1.3. Blanched Hazelnut Kernels (as is)
Tolerances for defects of blanched kernels' (as is) should be as in table – 4.

1.2.4.1.4. Roasted Hazelnut Kernels (as they are)
Tolerances for defects of roasted kernels' (as is) should be as in table – 4.

1.2.4.1.5. Partly Blanched Hazelnut Kernels
Tolerances for defects of the partly blanched kernels should be as in table – 4.

1.2.4.1.6. Partly Roasted Hazelnut Kernels
Tolerances for defects of the partly roasted kernels should be as in table – 4.

1.2.4.1.7. Hazelnut Kernels Salted or Fried in Oil
Hazelnut kernels salted or fried in oil should be prepared by dipping the hazelnut kernels into salt then dry roasting or frying it in cooking oil. Kernels fried in oil may be salted or not.

1.2.4.1.8. Diced Hazelnut Kernels
Diced hazelnut kernels should be prepared by chopping the kernel following the appropriate techniques.

1.2.4.1.9. Cubic Hazelnut Kernels
Cubic hazelnut kernels should be prepared by slicing the kernels into cubes following the appropriate techniques.

1.2.4.1.10. Sliced Hazelnut Kernels
Sliced hazelnut kernels should be prepared by slicing the kernels into leaves following appropriate techniques.

1.2.4.2. Types of Class II

1.2.4.2.1. Defected Blanched Hazelnut Kernels (as is)
Tolerances for defects of defected blanched hazelnut kernels (as is) should be as in table – 5.

1.2.4.2.2. Defected Roasted Hazelnut Kernels (as they are)
Tolerances for defects of defected roasted hazelnut kernels (as is) should be as in table – 5.

1.2.4.2.3. Defected Diced Hazelnut Kernels
Tolerances for defects of defected diced hazelnut kernels should be prepared by chopping the defected kernels following the appropriate techniques.

1.2.4.2.3. Defected Sliced Hazelnut Kernels
Defected sliced hazelnut kernels should be prepared by slicing the defected kernels into leaves following the appropriate techniques.

TABLE – 4 Tolerances for defects of Processed Hazelnut Kernels in Class I, according to their Classes and Types (mass, max., %)

DEFECTS	Limits				
	Blanched or Roasted Hazelnut Kernels			Blanched and Roasted Hazelnut Kernels (as they are)	Partly blanched or partly roasted hazelnut kernels
	I / Extra	I / Class I	I / Class II		
Total of shrunken, shriveled, tumurous, yellowish	0,5	2	4	4	6
Total of rotten, mouldy, concealed mould, bitter yellowish and rancid yellowish	0,5	1	1,5	1,5	1,5
New crop Old crop	1	1,5	2	2	2
Total of mechanically damaged, broken, crushed [1])	6	10	15	15	20
Pieces of skin, particles and powder of hazelnut	0,5	0,5	0,5	1	1
Mixture of Group (pointed in round, round in pointed)	5	10	10	10	20
Partly skin removed kernels [2]) (spotted)	5	10	12	Not required	Not required

1) the rate of broken hazelnut kernels should not exceed 1%, in I / extra; 2% in I / Class I; 4% in I / Class II within the defects.

2) The skin should not exceed ½ of the hazelnut's surface. In I/extra class kernels having a larger skin than ½ of the surface in I / Class I up to 1%; in I / Class II. Up to 2% of pieces of skin (spots) smaller than 3 mm are not considered as defect.

TABLE – 5 Tolerances for defects of blanched or roasted hazelnut kernels (as is) in Class II, according to defected hazelnut kernels from which they are made of (mass, at max, %).

DEFECTS	Limits			
	In shrunken or shriveled hazelnut kernels	In broken hazelnut kernels	In touched hazelnut kernels	In mixed defected hazelnut kernels
Total of shrunken, shriveled, tumurous, yellowish	Not required	4	4	Not required
Total of rotten, mouldy, concealed mould, yellowish and rancid	1,5	1,5	1,5	1,5
New crop Old crop	2	2	2	2
Mechanically broken	4	4	Not required	Not required
Broken	4	Not required	4	Not required
Pieces of skin, particles and powder of hazelnut	1	1	1	1
NOTE: In blanched or roasted defected hazelnut kernels (as they are), the amount of hazelnut kernel, which has its own name, should be at least %90 in mass.				

1.3. – Size Tolerances

1.3.1. – 0,2 mm larger or smaller kernels may be present in the defined size

1.3.2. – In blanched, roasted hazelnut kernels and diced hazelnut kernels in Class I, the total mass of hazelnuts mixed from one size below and/or one size above should be maximum 10% in mass.

1.4. – THE ARTICLE NUMBERS OF PROPERTY, INSPECTION AND TEST

The properties of processed hazelnut kernels together with the article numbers for their inspection and test are given in table 6.

TABLE 6 – The Article Numbers of Property, Inspection and Test

Property	Article number of property	Article number of inspection and test
Packing and Marking	3.1 – 3.2	2.2.1.
Sensory and Physical	1.2.1.1. – 1.2.2 – 1.2.3. 1.2.4. – 1.3	2.2.2.
Chemical		
- Humidity	1.2.1.2.	2.3.2.
- Free fatty acids	1.2.1.2.	2.3.3.
- Peroxide counts	1.2.1.2.	2.3.4.
- Aflatoxin B_1	1.2.1.2.	2.3.5.
- Aflatoxin $B_1+B_2+G_1+G_2$	1.2.1.2.	2.3.5.
Microbiological		
- Total mesophylic (aerobic)	1.2.1.3.	2.3.6.
bacteria count	1.2.1.3.	2.3.7.
- Yeast and Mold	1.2.1.3.	2.3.8.
- Coliforms	1.2.1.3.	2.3.9.
- E. Coli	1.2.1.3.	2.3.10.
- Salmonella	1.2.1.3.	2.3.11.
- Staph. aureus	1.2.1.4.	2.3.12.
Radioactivity		

2- SAMPLING, INSPECTION AND TESTS

2.1. Sampling

The processed hazelnut kernels, which are the same of package, package's bigness, group, class, type, size, product year, production year, party, number of series/codes and which are offered to inspection in once, are respected as a party.

2.1.1. Sampling From Large Packages

Package size weighing 2 kg and heavier are considered as large packages. Samples from large packages are taken in numbers given in table 7. Therefore, the packages, which constitute one party, are numbered beginning with one as 1,2,3,4…..N. Random from any package is respected up to N/n=r. If N/n is not an integer, (r) is completed to an integer and the (r). package is separated as the sample. The process of counting and separating is continued until reaching to number (n). Minimum 200 g samples are taken from each package of the big separated packages, then by mixing, the mixed sample is prepared and 500 g sample from the mixed sample is taken as needed.

2.1.2. Sampling from Small Packages

For sampling from small packages, (outer) packages, which contain small consumer packages, are separated as it is given in article 2.1.1. The small packages in the separated ones or the package number of the parties in the totally small consumer packages respected (N), the

sample, which is equivalent to (n) is again separated as it is given in article 2.1.1.suitable to table 7. By opening these separated consumer packages, the processed hazelnut kernels inside are brought together and mixed. Sampling is made from the existing mixed samples at least 500 g as needed.

TABLE – 7 The Sampling From Parties and the Number of Acceptable Defected Sample

Package numbers in the party (N)	Sample number separated for sampling (n)	Acceptable defected sample number [1])
Up to 90	3	0
91- 280	13	1
281 – 500	20	2
501 – 1200	32	3
over 1201	50	5
1) the number of acceptable defected sample is only for marking and package		

2.1.3. Sampling for Microbiological Analyses
Samples for microbiologic analysis is taken into sterile jars under aseptic conditions with sterile materials. The sample, which is taken from 200g or smaller consumer packages in order to constitute the party for microbiologic analysis is send to the laboratory without opening its original package.

2.2. Inspections

2.2.1. Package Inspections
The package inspection is made through looking and weighing It is controlled whether it has subjects of marking. It is examined for the suitability to the article 3.1 and article 3.2.

2.2.2. Sensitive or Physical Inspection
Sensitive or physical inspection is made through cutting, looking, selecting defected kernels, smelling, tasting, screening according to TS 1226, measuring and weighing.

Suitability to article 1.2.4, article 1.2.2, article1.2.3, article 1.2.4 and article 1.3. is examined.

2.3. Tests
Distilled water is used in tests and preparations of solutions. The solutions used in tests should be prepared based on TS 545 and indicator solutions should be prepared based on TS 2104, determinations should be carried out parallel with at least two samples and the arithmetic mean of two values should be evaluated.

2.3.1.Preparing Analyze Samples

Samples of analysis are prepared after undergoing the sensitive or physical inspection of processed hazelnut kernels. The remaining sample is homogeneously mixed and is preserved in a glass container which can be closed very well.

2.3.2 Humidity

The determination of humidity is made based on TS 972. Suitability to article 1.2.1.2 is examined.

2.3.3. Free Fatty Acids

Free fatty acids is determined in extracted oil with a diethylether from the sample as oleic acid based on TS 1605. Suitability to article 1.2.1.2 is examined.

2.3.4 Peroxide Number

The determination of peroxide number is realized in extracted oil with a diethylether from the sample based on TS 4964. Suitability to article 1.2.1.2 is examined.

2.3.5.Aflatoxin

The determination of aflatoxin is made based on TS 4672. Suitability to article 1.2.1.2 is examined.

2.3.6. Total Aerobic Plate Count

The enumeration of total aerobic plate count is made based on TS 4265. Suitability to article 1.2.1.3 is examined.

2.3.7. Yeast and Mould

The enumeration of yeast and mould is made based on TS 6580. Suitability to article 1.2.1.3 is examined. In necessity, commercial growth media can be used.

2.3.8.Coliforms

The enumeration of coliform is made according to TS 4265. Suitability to article 1.2.1.3 is examined.

2.3.9.E.Coli

The searching for *E.coli* is made according to TS 4265. Suitability to article 1.2.1.3 is examined.

2.3.10 Salmonella

The searching for salmonella is made according to TS 7438. Suitability to article 1.2.1.3 is examined.

2.3.11 *Staph.aureus*

The searching for *Staph aureus* is made according to TS 6582. Suitability to article 1.2.1.3 is examined.

2.3.12 Radioactivity

Authorized establishments make the determination of radioactivity. Suitability to article 1.2.1.4 is examined.

2.4.EVAULATION

When each result of these inspection and test results are suitable to this standard the party is accepted suitable for the standard.

2.5.The report of inspection and test

The following information should be in the report of inspection and test at least:

- The name, address of the place and laboratory which made the inspection and test, the names, functions, and professions of the authorized persons who made and/or signed the inspection and test
- The date of the inspection and test
- The introduction of the sample
- The standard numbers which are applied in the inspection and test.
- Result announcement.
- The precautions taken for eradicating the objection factors, which can change the results of the inspection and test.
- The process, which is not mentioned in the applied inspection or test methods or are not regarded as necessary, but which took part in the inspection and test.
- Suitability to the standard.
- Report date and number.

If the goods is suitable to standard for exporting, expire date of the control certificate which will be given to exporter is 30 days.

3.OFFERING TO THE MARKET (Market Supplying)

3.1.Packaging

The packages should be made of new, clean, dry and scentless materials, which do not effect the processed hazelnut kernels or which are not effected by the processed hazelnut kernels. The packages can be in the shape of distribution and small consumer packages. The small packages can be put within the big packages.

The tolerance for the mess of processed hazelnut kernels in the packages, should be suitable the values given in table 8 depending on the bigness of packages.

Table 8 – The Negative Deviation Tolerance According to the Size of the Package

Size of package (g)	Negative deviation tolerance at most %
Up to 50	4
51-100	3
101-200	2,5
201-500	2
501 and over	1,5

3.2 Marking

The following information will be placed, printed or labeled on the processed hazelnut kernels packages in an indelible and legible manner.

- Name or acronym of the firm, its address and trade mark (if any)
- The number of this standard (as TS 1917)
- Name of the product (as processed hazelnut kernels)
- Group
- Class
- Type
- Production date (month and year)
- One of the party, serial/code number
- Crop year
- Size
- Net weigh (g or kg)
- The expiration date or shelf life advised by the firm
- When small packages in big packages are offered to the market, the information above and number of small packages inside should be written on the big packages.

The above information may be given also in foreign languages for export products.

3.3 Protection and transportation

- Processed hazelnut kernels and their packages should not be kept in processing plants, depots and vehicles together with foreign matters spreading odor and materials dirtying these.
- It should be protected in place, which is not over than 25?and not in direct sunlight.
- The packages should be kept in ventilated places and should not be left under rain and should not be loaded or unloaded under such conditions.
- When the processed hazelnut kernels are packaged in bags, they should be placed on wooden pallets and should not be put higher than six bags. Hooks should be used in loading and unloading the packages of the processed hazelnut kernels.

4. VARIOUS PROVISIONS

4.1 The manufacturer or seller is obliged to show or give the appropriateness certificate to the standard for the processed hazelnut kernels, which are declared to be produced according to

this standard, when demanded. For the processed hazelnut kernels, subjected for selling in the certificate the followings should be mentioned:

- Suitability to the properties given in article 1
- Inspections and tests given in article 2 are done and favorable results are got.

4.2 – The matters, which are not mentioned in this standard should be processed according to relative directives.