Food and Agriculture Organization of the United Nations

World Health Organization

CODEX ALIMENTARIUS
INTERNATIONAL FOOD STANDARDS

CODEX ALIMENTARIUS
STANDARD

REGIONAL STANDARD FOR SOYBEAN PRODUCTS FERMENTED WITH *BACILLUS* SPECIES (ASIA)

CXS 354R-2023

ADOPTED 2023
AMENDED 2026

CXS 354R-2023

History of the standard

2026 Amendments

Following decisions taken at the Forty-ninth Session of the Codex Alimentarius Commission in 2026, amendments were made to insert sampling plans for provisions relevant to the commodity in Section 9: “Methods of analysis and sampling”.

This publication was reformatted and published in 2026.

Adopted in 2023.

1 Scope

This standard applies to products, as defined in Section 2: "Description", for direct consumption, including for catering purposes, repacking or further processing if required. This standard does not apply to the product covered by the *Regional standard for fermented soybean paste (Asia)* (CXS 298R-2009).[1]

2 Description

2.1 Product definition

Soybeans fermented with *Bacillus* spp. (solely or together with other microorganisms), that normally retain the shape of soybeans and are not a type of paste, although some of the soybeans may be crushed during the manufacturing process. The final products may be sticky and can be further processed into various forms of products.

2.2 Classification

2.2.1 Natto

Soybeans (including crushed soybeans, hereinafter referred to as soybeans) are soaked in water or diluted salty water, then steamed and fermented with *Bacillus subtilis* var. natto. No material or ingredients shall be added after fermentation.

Natto shall be sticky and filamentous, substance must be visible when a bean in natto is picked up.

2.2.2 Cheonggukjang

Soybeans soaked in water are boiled, steamed or baked and then fermented with naturally occurring or cultivated microorganisms (i.e. *Bacillus* spp. including *Bacillus subtilis*) for a few days. Optional ingredients described in Section 3.1.2.2: "Cheonggukjang" may be added only after fermentation. The final product, cheonggukjang, which complies with the component requirement, may be presented in the forms of powder, paste and spherical pellet.

2.2.3 Thua nao

Soybeans are soaked in water, steamed or boiled, and wrapped in broad leaves such as banana leaves. They are fermented with *Bacillus* spp. (solely or may contain other microorganisms). Optional ingredients described in Section 3.1.2.3: "Thua nao" may be presented/added. The final product, thua nao, which complies with the component requirement, may be presented in paste or dried forms, e.g. powder, sheet, and pellet.

3 Essential composition and quality factors

3.1 Composition

3.1.1 Basic ingredients

a) soybeans;

b) potable water; and

c) *Bacillus* spp. (naturally occurring or cultivated microorganisms). These are not pathogenic and do not produce toxins.

3.1.2 Optional ingredients

3.1.2.1 *Natto*

a) grains and/or flour (wheat, rice, barley, etc.);

b) salt;

c) seaweed and/or seaweed powder; and

d) other ingredients as appropriate.

3.1.2.2 *Cheonggukjang*

a) Naturally occurring or cultivated microorganisms (other than *Bacillus* spp.). These are not pathogenic and do not produce toxins;

b) salt;

c) garlic;

d) red pepper powder; and

e) other ingredients as appropriate.

3.1.2.3 *Thua nao*

a) other naturally occurring or cultivated microorganisms (other than *Bacillus* spp.). These are not pathogenic and do not produce toxins;

b) salt; and

c) other ingredients as appropriate

3.2 Quality criteria

The soybean products fermented with *Bacillus* spp. shall have the characteristic flavour, odour, colour, and texture of the product. There should be no visible foreign matters in the products.[i]

[i] Any visible objectionable foreign detectable matter or material not usually associated with the raw material used.

3.3 Component requirement

The soybean products fermented with *Bacillus* spp. should comply with the requirements listed in Table 1.

Table 1

Product name	Moisture content (%, w/w)	Protein (%, w/w)	Lipid (%, w/w)
Natto	≥ 53.0	≥ 10.0	≥ 5.0
Cheonggukjang	≤ 58.0	≥ 12.5	≥ 4.0
Thua nao	≥ 53.0 (in case of dried form ≤ 15.0)	≥ 10.0	–

Note:

w/w = wet weight basis

3.4 Classification of defectives

Any products that fail to meet the applicable quality requirements, as set out in Section 3.2: "Quality criteria" and Section 3.3: "Component requirement", should be considered defective.

3.5 Lot acceptance

A lot should be considered as meeting the applicable quality requirements referred to in Section 3.2: "Quality criteria" when the number of defectives, as defined in Section 3.4: "Classification of defectives", does not exceed the acceptance number (c) of the appropriate sampling plans with an acceptable quality level (AQL) of 6.5 (see relevant sampling plan in Section 9.1: "Sampling plan").

4 Food additives

None permitted.

5 Contaminants

The products covered by this standard shall comply with the maximum levels of the *General standard for contaminants and toxins in food and feed* (CXS 193-1995).[2]

The products covered by this standard shall comply with the maximum residue limits (MRLs) for pesticides established by the Codex Alimentarius Commission.

6 Hygiene

It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the *General principles of food hygiene* (CXC 1-1969),[3] and other relevant Codex texts, such as codes of hygienic practice and codes of practice.

The products should comply with any microbiological criteria established in accordance with the *Principles and guidelines for the establishment and application of microbiological criteria related to foods* (CXG 21-1997).[4]

7 Weights and measures

7.1 Net weight

The weight of the products covered by the provisions of this standard shall be indicated in accordance with the *General standard for the labelling of pre-packaged foods* (CXS 1-1985).[5]

7.2 Lot acceptance

The requirements for net weight should be deemed to be complied with when the average net weight of all containers examined is not less than the declared weight, provided that there is no unreasonable shortage in individual containers (see relevant sampling plan in Section 9.1: "Sampling plan").

8 Labelling

The products covered by the provisions of this standard shall be labelled in accordance with the *General standard for the labelling of pre-packaged foods* (CXS 1-1985).[5]

8.1 Name of the product

The products are soybean products fermented with *Bacillus* spp. The product should be designated with the appropriate term in Section 2.2: "Classification". Other names may be used in accordance with the law and custom of the country of retail sale in the manner not to mislead consumers.

8.2 Labelling of non-retail containers

The labelling of non-retail containers should be in accordance with the *General standard for the labelling of non-retail containers of foods* (CXS 346-2021).[6]

9 Methods of analysis and sampling

For checking compliance with this standard, the methods of analysis and sampling contained in the *Recommended methods of analysis and sampling* (CXS 234-1999)[7] relevant to the provisions in this standard shall be used.

9.1 Sampling plan

Sampling plans in Table 2 are applicable for flavours, odours, colours and texture.

Sampling plans in Table 2 or Table 3 (upon the agreement between both trading parties) are applicable for net weight, moisture,[ii] protein,[iii] and lipid content.[iv]

[ii] Natto, Cheonggukjang and Thua nao only.
[iii] Natto, Cheonggukjang and Thua nao only.
[iv] Natto and Cheonggukjang only.

Table 2 Inspection by attributes plans in accordance with ISO 2859-1 (AQL=6.5%)

Lot size (number of packages, each containing 1 or more units)	Inspection level					
	Reduced		Normal		Tightened	
	Sample size (n)	Acceptance number (c)	Sample size (n)	Acceptance number (c)	Sample size (n)	Acceptance number (c)
2–15	2	0	2	0	3	0
16–50	5	1	8	1	13	1
51–90	5	1	13	2	13	1
91–150	8	2	20	3	20	2
151–280	13	3	32	5	32	3
281–500	20	5	50	7	50	5
501–1 200	32	6	80	10	80	8
1 201–3 200	50	8	125	14	125	12
3 201 and over	80	10	200	21	200	18

Notes:

- If sample size n equals to or exceeds lot size, carry out 100 percent inspection.
- The number of samples to be analysed is n. If the number of samples that do not meet the criteria is less than or equal to c, the lot should be accepted. Otherwise, the lot should be rejected.

Table 3 Inspection by variable plans in accordance with ISO 3951-1 (AQL=6.5%)

Lot size (number of packages, each containing 1 or more units)	Inspection level					
	Reduced		Normal		Tightened	
	n	k	n	k	n	k
2–15	4	0.586	4	0.735	3	0.950
16–25	4	0.586	6	0.939	6	1.061
26–50	4	0.586	6	0.887	9	1.218
51–90	5	0.550	9	0.869	9	1.190
91–150	7	0.507	14	0.935	14	1.147
151–280	9	0.628	21	0.945	21	1.227
281–500	14	0.601	33	1.036	32	1.225
501–1 200	21	0.830	52	1.120	50	1.245
1 201–3 200	33	0.954	79	1.195	78	1.281
3 201 and over	52	1.120	124	1.239	122	1.325

Notes:

- If sample size n equals to or exceeds lot size, carry out 100 percent inspection.
- In case of minimum limit, if the sample mean is higher than the minimum limit plus k times standard deviation, the lot should be accepted. Otherwise, reject the lot.
- In case of maximum limit, if the sample mean is lower than the maximum limit minus k times standard deviation, the lot should be accepted. Otherwise, reject the lot.

REFERENCED TEXTS

1 *Regional standard for fermented soybean paste* (CXS 298R-2009).

2 *General standard for contaminants and toxins in food and feed* (CXS 193-1995).

3 *General principles of food hygiene* (CXC 1-1969).

4 *Principles and guidelines for the establishment and application of microbiological criteria related to foods* (CXG 21-1997).

5 *General standard for the labelling of pre-packaged foods* (CXS 1-1985).

6 *General standard for the labelling of non-retail containers of foods* (CXS 346-2021).

7 *Recommended methods of analysis and sampling* (CXS 234-1999).

Codex Alimentarius

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Codex Secretariat
Contacts

codex@fao.org
codexalimentarius.org
x.com/FAOWHOCodex
youtube.com/@UNFAO

Food and Agriculture Organization of the United Nations
Rome, Italy

FAO and WHO. 2026. *Regional standard for soybean products fermented with* Bacillus *species (Asia).* Codex Alimentarius Standard, No. CXS 354R-2023. Codex Alimentarius Commission. Rome.
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