

KERNEL QUALITY STANDARD FOR PROCESSORS



1. CERTIFICATED HACCP SYSTEM

Each processor must have a third party certified HACCP system in place. The system must be certified by a registered accredited certification body.

2. APPROVED SUPPLIER PROGRAM

All nut-in-shell (NIS) suppliers of certified processors must have in place a food safety based approved supplier program that is 2nd or 3rd Party audited.

3. COUNTRY OF ORIGIN

All macadamia nuts sold under the AMS kernel product quality standard must be Australian grown.

4. NUT IN SHELL STORAGE AND HANDLING

- Prior to being dried to cracking moisture, NIS must be stored by the processor in conditions that provide forced ventilation.
- NIS must be dried to less than 7.5% moisture within 14 days following intake.
- NIS held in ambient conditions should be processed within 90 days.
- NIS held for longer than 90 days must be stored in a temperature-controlled environment at <15 °C and, if possible, a relative humidity not exceeding 70% for up to 270 days
- or an alternative validated process that is proven to not adversely affect kernel quality.

The maximum recommended temperature cycle for drying macadamias is:

5-7 days at	32 °C
1-2 days at	38 °C
1-2 days at	44 °C
Finish drying at	50 °C

5. KERNEL PRODUCT CLASSIFICATION AND LABELLING

5.1 Standard description format

This standard requires that the product be descriptively labelled using the following terminology or abbreviation:

- Wholes (W), Halves (H), Pieces (P), Natural (N), Diced (D)
- Minimum % wholes, with wholes always being the first stated in a blend of wholes and halves
- Size range in mm

Wholes – Kernels which are not split into halves, nor with more than ¼ of the kernel missing, provided that the kernel contour is not materially affected by the missing portion.

Halves – Means that approximately half of a whole kernel, with not more than 1/8 of its mass is missing. Halves are measured across the widest axis.

Pieces – Pieces can be naturally broken or diced with the size specifications listed in Table 1.

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Unless otherwise defined, the size ranges stated will be understood to indicate that product will pass over a smaller round screen (with size expressed in mm diameter) and pass through a larger round screen (with size expressed in mm diameter). Alternative sizing methods may be used but must obtain equivalent sizing to that achieved by passing over a round screen. Size range in mm with a 10% tolerance for over or under-sized kernels.

Different quality grades of product should use the following abbreviations:

Premium PREM

Commercial COM

The standard terminology and abbreviation for roasted product is as follows:

Dry Roasted (unsalted) DR

Dry Roasted & Salted DRS

Oil Roasted (unsalted) OR

Oil Roasted & Salted ORS

Non-standard kernel styles must incorporate the prefix "SP" to indicate a special (non-standard) specification.

An example of the descriptive labelling convention, a blend of 70% whole kernel and 30% half kernel of the size range 17-20mm which has been Dry Roasted & Salted must be labelled as follows:

PREM Style 1 70%W 17-20mm DRS

5.1 Style conventions

The Australian Macadamia industry uses the term "Style" to define the various kernel sizes and blends.

Table 1. Accepted definitions for labelling

Style 0	Min 95% whole kernel	>20 mm
Style 1	Min 90% whole kernel	17-20 mm
Style 1s	Min 90% whole kernel	14-18 mm
Style 2	Min 50% whole kernel	>13 mm
Style 3	Min 15% whole kernel	>13 mm
Style 4L	Min 80% halves	>13 mm
Style 4S	Halves and pieces	10-14 mm
Style 5	Pieces	8-12 mm
Style 6	Pieces	5-9 mm
Style 7	Pieces	3-6 mm
Style 8	Pieces/meal	<4 mm

The style convention in Table 1 is also applicable for commercial grade kernel but must use the prefix of COM as follows:

COM Style 2 50%W >13 mm DRS

6. FINAL KERNEL PRODUCT TESTING

a. Microbiological standards

Table 2. Microbiological testing requirements and limits

Organism	Max limits raw kernel	Max limits roasted kernel	Test method
E-coli	<3	<3	/g (AS 5013.15 – 2006)
Salmonella	N.D.	N.D.	/250 g (AS 5013.10 – 2009)
Standard plate count	<30,000 cfu	<3,000 cfu	/g (AOAC 990.12) or (AS 5013.1)
Yeasts and moulds	<20,000 cfu	<2,000 cfu	/g (AS1766.2.2 – 2009)

b. Chemical standards

Table 3. Chemical testing requirements and limits (at time of packing)

Chemical	Maximum limits	Test method
Total aflatoxin (ug/kg)	Must meet consuming country's limits	HPLC/LCMS
B1 (ug/kg)	Must meet consuming country's limits	HPLC/LCMS
Free fatty acid	0.5%	(AOCS Ca-5a-40)
Peroxide value	≤2 meq/kg (2 years shelf life)	(AOCS Cd-8b-90)
Peroxide value	2 < X < 3 meq/kg (1 year shelf life)	(AOCS Cd-8b-90)

c. Sampling for microbiological & chemical analysis

All product must be sampled and tested at the minimum rate of not less than 1.0 kg for each production lot (or batch) of kernel. A 1.0 kg test sample must be collected using a minimum of 20 sub-samples, taken representatively throughout the production of the lot.

Lot size for this purpose must not exceed 20 tonnes of kernel.

If a validated pasteurisation process is used, lot sizes may be increased to 30 tonnes.

Samples must represent each style produced and are to be collected at the point of kernel packing.

d. Laboratory accreditation

All laboratories undertaking microbiological and chemical analysis must be accredited by NATA or an ISO17025 Accredited equivalent Food Physico-Chemical and Microbiological analytical laboratory.

7. KERNEL RETENTION SAMPLES

Retention samples for microbiological and chemical analysis must be retained for each batch of product at a minimum rate of 400 g per lot (lot size must not exceed the limits defined in point 6c) under the recommended storage conditions of the finished product and for the shelf life of the product in packaging that will protect the integrity of the product for the intended test purpose.

8. PHYSICAL KERNEL SPECIFICATIONS AT THE POINT OF PACKING

A: Macadamia kernel sold as premium grade must meet the acceptable limits for kernel moisture, appearance, taste, foreign material, shell and defective kernel as set out in Table 4.

Table 4. Physical kernel specifications

	Premium grade
	Raw
Kernel moisture content	Not to exceed 1.8%
Appearance and taste	White/cream in colour or as specified for roasted product. Free from excessive dust or oil. Crunchy texture (excluding meal) with a typical macadamia flavour. Free from off odours and flavours
Foreign matter*	Target nil
Loose shell**	Not more than one piece per 100 kg
Impacted shell***	Not more than 1% of kernels by weight
Unsound Kernel (Reject plus commercial grade kernel)****	Not more than a combined total of 3% of Unsound kernel by weight of which Reject grade kernel must not exceed 2% by weight.
Visible mould	Target nil
Wholes, halves, piece count	Must meet specification per Table 1 and/or as per customer requirements

Definitions

*Foreign Material includes any product that is not kernel and/or shell.

**Loose shell is defined as pieces of shell greater than 3 mm in diameter x 2 mm thick

***Impacted shell is defined as shell that is embedded in the kernel and is greater than 1x1x1 mm

****The definitions for reject and commercial grade kernel can be found in the Australian Macadamia Society Kernel Classification guide.

B: Sampling. All product must be representatively sampled and tested. Lot size for this purpose shall not exceed 1 tonne of kernel for each test. Samples are to represent each style produced and are to be collected prior to or at the point of kernel packing.

9. AGRICHEMICAL RESIDUE TESTING

Each processor must participate in the Australian macadamia industry national residue testing program (NRS).

All macadamia product sold under the AMS standard must comply with maximum residue limits for agricultural chemicals as published in the Food Standards Code.

All products must conform to importing country's maximum residue levels (MRL) for agricultural chemicals.

10. BULK PACKAGING SPECIFICATIONS FOR KERNEL

All macadamia kernel sold under the AMS quality standard must be packaged in a form and manner appropriate to the claimed shelf-life. In order to claim the maximum shelf-life of 24 months' product must be packed under controlled atmosphere using high barrier film.

The recommended structure of the liner is 12 µm PET / 9 µm Foil / 120 µm LLDPE with packs to be nitrogen-flushed and vacuum-sealed with a residual oxygen level of less than 2%. The target transmission rates are specified in Table 5.

Table 5. Bulk packaging transmission rate specifications

O2 barrier	H2O barrier
<0.10 cc / m2 / 24 h	<0.25 gm / m2 / 24 h

(at 25 °C, 75%RH, 1 atm)

All packers should implement a process for ensuring the integrity of the inner and outer packaging is maintained

II. PACKING AND LABELLING OF FINISHED KERNEL PRODUCT

All bulk packaging must comply with regulatory standards and display the following information:

- Packer or seller's name, address and contact details
- Country of origin
- Product code
- Lot code or unique code
- Net weight
- Shelf life (either by Best before Date or Pack Date and shelf life statement)

It is recommended that all bulk packaging display the following information:

- Pack date
- Best before date
- Recommended storage conditions

12. FINAL PRODUCT STORAGE

Storage should be in conditions that preserve quality and prevent insect infestation.

It is recommended that finished product be stored under suitable climate-controlled conditions prior to dispatch to the customer. The recommended maximum temperature for storage of macadamia kernel is 12 °C.

13. SHELF LIFE STANDARDS

Table 6. Shelf life guidelines for raw kernel

Pack size	Peroxide value at packing	Barrier properties of packaging*	Residual oxygen	Recommended storage	Best before date
Up to 25 kg	≤ 2 meq/kg	Oxygen – <0.10 cc / m2 / 24 h Water – <0.25 g / m2 / 24 h	≤ 2%	≤12 °C	24 months from pack date
Up to 25 kg	2 < X < 3 meq/kg	Oxygen – <0.10 cc / m2 / 24 h Water – <0.25 g / m2 / 24 h	≤ 2%	≤12 °C	12 months from pack date

*(at 25 °C, 75%RH, 1 atm)

14. KERNEL PRODUCT SPECIFICATION SHEETS

Processors must have a product specification sheet for each product sold under the AMS kernel product quality standard which must contain the following:

- Product code
- Product size details
- Description of acceptable taste and aroma
- Maximum acceptable moisture content
- Maximum levels of defective kernel, impacted shell and foreign material
- Maximum microbiological levels for Salmonella, E-coli, Standard Plate Count, Yeasts and Moulds
- Maximum levels for Aflatoxin, Peroxide Value and Free Fatty Acid
- Description of the pack date, shelf life and/or best before date.
- Recommended storage conditions.

15. REPROCESSING AND BLENDING OF FINISHED MATERIAL

When product is blended from batches of different production dates then the blended lot shall use the shelf-life of the oldest component.

In order for an extended shelf life to be claimed, the finished product must be tested and show chemical and microbiological results consistent with that extended shelf life.

All production and re-processing activities are to be conducted in a manner which is consistent with the delivery of high quality outcomes to customers throughout the supply chain.

16. PRODUCT TRACEABILITY

All finished product must have complete traceability back to a group of growers.