



Designation: D8433 – 22

Standard Specification for Food Safety and Quality of Hempseed Intended for Dehulling or Oil Extraction Food Purposes¹

This standard is issued under the fixed designation D8433; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

INTRODUCTION

Hempseed is grown for human consumption across the world, and many products are consumed in raw form with no further pathogen reduction step. To be fit for consumption, food safety and storage quality aspects need consideration to ensure acceptable seed is used. Minimum levels of quality and safety are defined in this specification to protect buyers and consumers from harm, address food safety risk where possible, and assist business-to-business transactions. This will allow for accurate descriptions for dehulling or oil extraction purposes or re-targeting product as necessary into various further non-food processing or other uses.

1. Scope

1.1 This specification establishes the maximum allowable *E. coli* and *Salmonella* microbial levels, moisture content, peroxide value (PV), free fatty acid (FFA) content, yeast and mold levels, representative heavy metals, total coliforms, foreign material, and discoloration for hempseed intended for human consumption.

1.2 This specification applies to plant breeders, hempseed producers, seed cleaners, processors, wholesalers, regulatory bodies, and analytical laboratories. This specification does not apply to viable hemp seed intended for germination and planting, and does not set limitations for pesticide limits, or physical purity beyond foreign matter. See **Note 1**.

NOTE 1—Additional hazard limits and characterization of attributes will be assessed in future versions of this document.

1.3 This specification describes minimum information required in a certificate of analysis.

1.4 Where aspects of this specification differ from regional regulatory jurisdictional requirements, the jurisdictional authority's directive shall take precedence.

1.5 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the*

responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D8270 Terminology Relating to Cannabis²

D8400 Guide for Assessing Spoilage of Hemp Seed Intended for Human Consumption

2.2 *AOAC International Standard:*

AOAC 935.29 Moisture in Malt³

2.3 *AOCS Standards:*⁴

AOCS Ca 5a-40 Free Fatty Acids in Crude and Refined Fats and Oils

AOCS Cd 8b-90 Peroxide Value, Acetic Acid, Isooctane Method

2.4 *DGHM Standard (German Society for Hygiene and Microbiology):*

DGF C-V 6a Peroxide Value Method according to Wheeler

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from AOAC International, 2275 Research Blvd., Suite 300, Rockville, MD 20850-3250, <http://www.aoc.org>.

⁴ Available from the American Oil Chemists' Society, 2710 S. Boulder, Urbana, IL 61802-6996.

¹ This specification is under the jurisdiction of ASTM Committee D37 on Cannabis and is the direct responsibility of Subcommittee D37.07 on Industrial Hemp.

Current edition approved July 15, 2022. Published August 2022. DOI: 10.1520/D8433-22.

2.5 ISO Standards:⁵

ISO 6579 Horizontal Methods for the Detection, Enumeration and Serotyping of Salmonella

ISO 16649-1 Horizontal method for the enumeration of beta-glucuronidase-positive *Escherichia coli*, Part 1

ISO 16649-2 Horizontal method for the enumeration of beta-glucuronidase-positive *Escherichia coli*, Part 2

ISO 21528-2 Horizontal method for the enumeration of Enterobacteriaceae, Part 2

2.6 MFHPB Standards:⁶

MFHPB-20 Methods for the Isolation and Identification of Salmonella from Foods and Environmental Samples

MFHPB-22 Enumeration of Yeasts and Moulds in Food

MFHPB-33 Enumeration of Total Aerobic Bacteria in Food Products and Food Ingredients Using 3M™ Petrifilm™ Aerobic Count Plates

MFHPB-34 Enumeration of *Escherichia coli* and Coliforms in Food Products and Food Ingredients Using 3M™ Petrifilm™ E. coli Count Plates

2.7 ICP-MS Standard:

ICP-MS Inductively Coupled Plasma Mass Spectrometry analytical technique⁷

3. Terminology

3.1 For definitions related to cannabis, see Terminology **D8270**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *biological hazard, n*—any microorganism or pathogen that can negatively affect human or animal health when ingested.

3.2.1.1 *Discussion*—Microorganisms include bacteria, yeast, mold, viruses, and parasites. Examples of biological hazards include, but are not limited to, norovirus, *Campylobacter jejuni*, *Salmonella* Enteritidis, and *Clostridium botulinum*. For the purposes of this specification, *E. coli* and *Salmonella* specifications are described.

3.2.2 *chemical hazard, n*—any chemical, solvent, agent, caustic compound, or any other toxic substance posing a potential danger or source of contamination.

3.2.2.1 *Discussion*—Examples of chemical hazards include, but are not limited to, pesticides, fertilizers, solvents, and reagents. For the purposes of this specification, four heavy metal specifications are included.

3.2.3 *crushing, v*—the act of extracting the oils, lipids, and fats of hempseed through expression or pressing.

3.2.4 *dehulled hempseed, n*—internal material of the hempseed.

3.2.4.1 *Discussion*—Dehulled hempseed is synonymous with hempseed heart, hempseed nut, and hulled hempseed.

⁵ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.

⁶ Available from Health Canada, Address Locator 0900C2, Ottawa, Ontario K1A 0K9, e-mail: hc.publications-publications.sc@canada.ca.

⁷ Available from National Center for Biotechnology Information, 8600 Rockville Pike, Bethesda, MD 20894, <https://www.ncbi.nlm.nih.gov>.

3.2.5 *moisture, n*—amount of water present in the test lot of whole seed expressed as a percentage or a fraction.

3.2.5.1 *Discussion*—Higher moisture conditions may favour microbial growth, which may affect overall food safety and shelf-life of a food product.

3.2.6 *pathogen reduction step, n*—a point in the food manufacturing process where harmful pathogens are deactivated or reduced to an acceptable level.

4. General Requirements

4.1 Consistent specifications for whole hempseed using a combination of attributes representing both the presence and absence of certain characteristics will provide a credible means for buyers and sellers to target product to appropriate use(s).

4.2 Hempseed producers, processors, and laboratories can verify minimum food safety and quality aspects for seed intended for human consumption, in addition to properties related to shelf life and spoilage.

4.3 Hempseed that may be discarded on visual review or in the absence of clearly defined quality metrics can be used by processors or redirected to other uses.

4.4 Hempseed that is assessed as unacceptable for food use may be repurposed for other by-products or further processing.

4.5 This specification can be used within buyer-seller transactions or for quality control purposes.

5. Specification for Food Safety and Quality

5.1 Specifications in **Table 1** indicate: (1) the minimum number of tests/analytes that shall be represented on a certificate of analysis and (2) the groupings of tests that shall determine if a lot/batch of seed is accepted for further processing or repurposed.

5.2 Maximum allowable amount of key microbials and acceptable moisture range levels present in seed are identified in **Table 1**. If any one result is out of specification, the lot is no longer a food-grade product unless otherwise treated/remediated.

5.3 Product integrity/shelf-life specifications are strong indicators for spoilage and rancidity. Any of these test results outside those listed in **Table 1** does not necessarily cause a batch rejection but could result in the product targeted for alternate processing or uses.

5.4 Dehulled hempseed discoloration may indicate improper handling of seed in which husk integrity is compromised (cracks or holes). See **Note 2**. This may facilitate microbial entry. Seeds normally cream colored may turn to shades of yellow through orange to brown. See **Note 3**.

NOTE 2—Improper handling can occur during transfer of seed using abrasive equipment or with unusually high temperatures during drying of seed for storage.

NOTE 3—Visual spoilage assessment of manually dehulled seed is outlined in Guide **D8400** – 21.

5.5 If thresholds in food safety are exceeded in **Table 1**, the identified biological or chemical hazard is deemed to be present and may result in illness or death.

TABLE 1 Specifications for Food Safety and Quality of Hempseed Intended for Dehulling or Oil Extraction Food Purposes

	Analyte	Specification for Dehulling ^A	Specification for Crushing ^B	Test Method
Food Safety: Microbial and Moisture Content, and Representative Heavy Metals	<i>E. coli</i>	<10 cfu/g	<10 cfu/g	MFHPB-34, IAO 16649-1 or ISO 16649-2
	Total coliforms	<500 cfu/g	<1000 cfu/g	MFHPB-34
	Enterobacteriaceae (EU only)	<150 cfu/g	<150 cfu/g	ISO 21528-2
	Salmonella spp. ^C Non-EU EU	Negative in 25 g Negative in 125 g	Negative in 25 g Negative in 125 g	MFHPB-20 ISO 6579
	Standard plate count (SPC)	<250 000 cfu/g	<500 000 cfu/g	MFHPB-33
	Moisture content	5 to 9 %	5 to 9 %	AOAC 935.29
	Representative Heavy Metals ^D	Lead ≤ 3 ppm Cadmium ≤ 1 ppm Mercury ≤ 0.1 ppm Arsenic ≤ 1 ppm	not available	ICP-MS
Product Integrity and Shelf Life ^E	Total yeast count	≤4500 cfu/g	≤5500 cfu/g	MFHPB-22
	Total mold count	≤4500 cfu/g	≤5500 cfu/g	MFHPB-22
	Peroxide Value Non-EU EU	≤5 meq/kg 2-5 meq/kg	≤5 meq/kg 2-5 meq/kg	AOCS Cd 8b-90 Solids: Ph.Eur. 9.0, 2.5.5 Liquid: DGF C-V1 6a
	Free fatty acid	<2 %	<2 %	AOCS Ca 5a-40
	Foreign Material	0.5 % or less	0.5 % or less	Visual estimate ^F
	Dehulled hempseed discoloration	≤1 %	≤2 %	Dehulled Hempseed Color Code Chart ^G

^A Source: Canadian Hemp Trade Alliance, Food Standards Subcommittee 2019 – Commonly accepted Canadian hemp food company specifications based on dehulled hempseed testing and food safety results, adapted from other similar edible oil food-grade standards: Health Canada, Food and Drug Regulations, Fats and Oils-Division 9; and Codex Standard for Edible Fats and Oils Not Covered By Individual Standards STAN 19-1981 (revised 2017).

^B Visual spoilage assessment of manually dehulled seed is outlined in Guide D8400 – 21.

^C If test result is positive, further confirmation tests shall be done to identify potential presence of harmful sub-species of Salmonella spp.

^D GRAS 2018 USA “The safety and the generally recognized as safe (GRAS) status of the proposed use of hulled hemp seeds in human food”. Levels described are for dehulled hempseed only. Further specifications for additional products are specific to each product and estimated daily consumption of that product by regional authorities. Reference: <https://www.usp.org/sites/default/files/usp/document/our-work/chemical-medicines/key-issues/c232-usp-39.pdf>.

^E These analytes are industry accepted values affecting quality during storage.

^F Visual estimate is currently accepted in the hemp food sector because foreign material is controlled in the incoming product prior to processing. Quality assurance employees may be trained to estimate foreign material, and laboratory test methods may be added in the future if appropriate.

^G Appendix X1. Color Code Chart, Guide D8400 – 21.

5.6 If a lot is noncompliant because of food safety specifications in Table 1 and the entire lot can be improved by means of an authorized microbiological pathogen reduction step, where subsequent laboratory testing shows microbial levels are reduced to meet the minimum specifications, the lot/batch shall be upgraded. If issues are caused by moisture levels, seed can be dried as a mitigation step and may qualify for an upgrade.

5.7 If a lot fails because of nonconformance with the maximum allowable dehulled seed discoloration and the entire lot can be “color sorted” by means of a “sorting step,” where subsequent testing shows discoloration levels are reduced to meet the maximum allowable discoloration, the status of a lot may be upgraded for the sorted portion of the lot.

6. Test Methods

6.1 MFHPB-34.

6.2 MFHPB-20.

6.3 MFHPB-33.

6.4 MFHPB-22.

6.5 AOAC 935.29.

6.6 AOCS Cd 8b-90.

6.7 AOCS Ca 5a-40.

6.8 DGF C-V1 6a.

6.9 ICP-MS.

6.10 ISO 16649.

6.11 ISO 21528-2.

6.12 ISO 6579.

6.13 Other qualified methods that demonstrate equivalent results.