



Designation: D8499 – 23

## Standard Guide for Meeting the Specifications of ASTM D8432<sup>1</sup>

This standard is issued under the fixed designation D8499; 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 reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### INTRODUCTION

In the cannabis/hemp industry, fairness in the marketplace for cannabis/hemp products is desired. Thus, standards for assuring safety, quality, and weight stabilization during key steps of the cannabis/hemp flowers sojourn are in order. While there are numerous means of meeting or exceeding the specifications of Specification D8432, additional guidance will provide purveyors who move the cured crop from the packaging process via the supply chain to another licensed operator or to the end user an assist in meeting or exceeding the specifications.

### 1. Scope

1.1 Specification D8432 covers the environmental conditions, such as temperature, humidity, and lighting under which the cured, dry, cannabis/hemp flowers packaged in fresh format and intended for human use can be maintained in transit to assure the safety, quality, and weight stabilization of the packaged flower. This guide suggests means by which the purveyor of transportation of cannabis/hemp can meet those specifications.

1.1.1 This standard does not apply to frozen cannabis/hemp.

1.1.2 This standard does not apply to cannabis/hemp intended for extraction.

1.2 This standard applies to controlling the environment surrounding packaged cannabis/hemp flower in transit, either within the package itself or in the environment surrounding the package, or both.

1.3 This standard is to be followed by licensed operators in the cannabis/hemp space who move the packaged crop(s) through the distribution supply chain to another licensed operator or to the end user.

1.4 Purveyors of cannabis/hemp flower include, but are not necessarily limited to: the packager, transportation companies, warehousing operations, and retail operations.

1.5 Security of the packaged cannabis/hemp flower while in transit is not within the scope of this standard.

1.6 This standard is intended to remain valid until ownership of the packaged cannabis/hemp flower is transferred to another licensed operator or to the final consumer.

1.7 Authorities having jurisdiction may have additional or alternate requirements which shall take precedence or supersede this standard.

1.8 *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.*

1.9 *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:*<sup>2</sup>

D8196 Practice for Determination of Water Activity ( $a_w$ ) in Cannabis Flower

D8197 Specification for Maintaining Acceptable Water Activity ( $a_w$ ) Range (0.55 to 0.65) for Dry Cannabis Flower Intended for Human/Animal Use

D8233 Guide for Packaging and Labeling of Consumer Resin Cannabis Products for Sale to Adult Consumers, Legally Authorized Medical Users, and Caregivers in a Business-to-Consumer Retail Environment (Retailers)

D8270 Terminology Relating to Cannabis

D8309 Guide for Stability Testing of Cannabis-Based Products

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D37 on Cannabis and is the direct responsibility of Subcommittee D37.04 on Processing and Handling.

Current edition approved May 1, 2023. Published June 2023. DOI: 10.1520/D8499-23.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## D8432 Specification for Environmental Conditions while In Transit for Packaged Cannabis/Hemp Flower

### 3. Terminology

3.1 *Definitions*—General definitions are in accordance with Terminology **D8270**, unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *environmental conditions, n*—the atmosphere immediately surrounding the cannabis/hemp flower, whether contained within the package in which the flower is contained, or in the larger space surrounding the package containing the packaged cannabis/hemp flower.

3.2.2 *relative humidity, n*—the relative humidity (RH) of an air-water mixture is defined as the ratio of the partial pressure of water vapor surrounding the cannabis/hemp flower ( $p_{H_2O}$ ) to the equilibrium vapor pressure ( $p^*_{H_2O}$ ) over a flat surface of pure water at a given temperature.

$$RH = p_{H_2O} / p^*_{H_2O}$$

### 4. Significance and Use

4.1 Standards and practices for assuring safety, quality, and weight stabilization during key steps of the cannabis/hemp flowers' sojourn are in order.

4.2 This standard is intended to assure safety, quality, and weight stabilization of packaged cannabis/hemp flower during transit operations.

4.3 This standard is intended to be used by purveyors who move the packaged cured flower between licensed operators or to the end user.

4.4 This standard is intended to be used by samplers and testing laboratories transporting samples to a laboratory to assure that samples analyzed represent as accurately as possible, the material that was gathered to provide the sample for analysis.

### 5. Monitoring Equipment

5.1 *Temperature*—Device or devices capable of measuring temperature to assure specifications of Specification **D8432** are met. Additionally, devices capable of measuring temperatures in a manner that advances systems optimization are suggested. Monitoring and tracking may be automated or manual.

5.2 *Relative Humidity*—A device or devices capable of measuring relative humidity to assure specifications of Specification **D8432** are met. Additionally, devices capable of measuring relative humidity in a manner that advances systems optimization are suggested. Monitoring and tracking may be automated or manual.

NOTE 1—Often equipment for monitoring both temperature and relative humidity are combined into a single apparatus or system. It is important to assure that both functions perform to meet specifications across the specification ranges.

### 6. General Considerations and Record Keeping

6.1 Transit equipment and facilities should be designed and maintained to assure conditions not conducive to mold growth. Design and operation should include orderly placement of packaged cannabis/hemp flower to prevent cross contamination

of the various categories of materials and the cannabis/hemp flower. In particular, these areas should be clean, dry (meeting the standards of Specification **D8432**), have adequate air circulation, and be monitored/validated periodically.

6.1.1 For transport of samples intended for laboratory analyses, appropriately sized containers, rather than entire vehicles may be designed to meet the recommendations of this standard. In particular, maintaining proper temperatures and relative humidities surrounding the sample(s) and assuring against contamination or cross contamination of samples is essential.

6.2 Vehicles used for transport should be clean, dry, and capable of maintaining air quality. The design and operation should also prevent or limit the accumulation of heat, steam, condensation, or dust if the packaged cannabis/hemp flower is not packaged in a container that has internal environmental control.

6.2.1 As necessary, consider equipping transit vehicles with close-fitting screens and/or filters to prevent the entry of dust, smoke, steam, odors, and contaminated air.

6.2.2 A transport vehicle should be designed, constructed, and maintained in a manner that permits it to be kept clean and orderly, permits effective cleaning of all its surfaces, prevents the contamination of the packaged cannabis/hemp flower and prevents the introduction of extraneous substances.

6.2.3 Regular maintenance and sanitation should be performed within internal areas where cannabis is transported to avoid product safety or contamination of concern to human health.

6.2.4 Standard Operating Procedures (SOPs) should be accessible by employees and applicable contractors for key operational elements including: sanitation and inspection of the transportation vehicle and equipment used in transport; employee hygiene; distribution, including transfer, and receipt of packaged cannabis/hemp, transportation of cannabis/hemp flower; managing product on hold or destined for destruction.

6.3 In accordance with Specification **D8432**, records shall be maintained to assure that the specifications of that standard are met. Records should also be kept of various systems design parameters and operating conditions used to meet the specifications or lead to necessary modifications to do so.

6.3.1 Distribution records should be maintained and may include: tracking personnel handling the product during distribution and records demonstrating adequate sanitation, maintenance, and environmental conditions of the carrier.

6.3.2 Record keeping can be automated or manual.

### 7. Control of Temperature

7.1 Specification **D8432** states that “The temperature of the environment immediately surrounding the packaged cannabis/hemp flower shall not exceed 30 °C (86 °F) for more than 2 hours”. This refers to cumulative temperatures above 30 °C in the environment. It behooves the handler of packaged cannabis/hemp flower to minimize any excursions over 30 °C.

7.2 If the controlled temperature volume of the transit vehicle is large, temperature mapping is recommended to assure that the temperature in the immediate area of the

packaged cannabis/hemp flower is being properly controlled. Single point temperature monitoring is often inadequate for such assurance.

## 8. Control of Relative Humidity

8.1 It is preferable that relative humidity surrounding the packaged cannabis/hemp flower be controlled to 55 % RH to 65 % RH during packaging, transit, and storage.

8.2 The relative humidity can be controlled in the environment surrounding the packaging, transit, or storage operation.

8.2.1 Careful selection of humidistats to control humidifying or dehumidifying devices is essential to maintain 60 %  $\pm$  5 % relative humidity in the environment.

8.2.2 Sufficient air movement/mixing/circulation is necessary to assure against cold or hot spots which could result in condensation which increases the risk of mold growth.

8.3 Optionally or in addition, the immediate environment of the packaged cannabis/hemp flower can be controlled within bulk or individual packaged using appropriate humidity control devices.

8.3.1 For samples intended for laboratory analyses, humidity control devices within the containers holding the sample intended for analysis should suffice to meet the relative humidity requirements of Specification D8197 if the transport vehicle is not so conditioned.

8.4 If it is ascertained that packaging materials such as mylar which have high moisture barrier properties to resist water vapor transmission has been used and validated to provide extended protection to hold the packaged cannabis/hemp flower to a water activity level of 0.55 ( $a_w$ ) to 0.65 ( $a_w$ ) per Practice D8196 and Specification D8197 in the journey from packager to final user, excursion outside the RH ranges of Specification D8432 for brief periods should not be of concern.

## 9. Control of Light Radiation Exposure

9.1 Light exposure (visible and ultraviolet (UV)) of the cannabis/hemp flower shall be limited to the minimum necessary for inspections.

9.2 When possible, UV filters should be used with fluorescent light fixtures. LED light fixtures are preferred as these do not produce UV radiation.

9.3 Lighting used should not alter the natural color or affect the quality of the cannabis/hemp flower, nor should it result in the production of natural toxins and/or reproduction of microorganisms of the cannabis/hemp flower.

9.4 Shading or shielding the cannabis/hemp flower from visible and UV light radiation up to and through the packaging operation will reduce potential damage to the flower. Further, if visible and UV light impervious packaging is used to contain the flower, the chances of inadvertent exposure once packaged is eliminated.

9.5 Light fixtures and bulbs for use in transit systems should be designed and positioned to assure the safety of personnel

and assure against contamination of the packaged cannabis/hemp flower in case of light bulb breakage.

## 10. Packaging as an Option for Relative Humidity and Light Radiation Exposure Control

10.1 The relative humidity can be controlled in the environment of the transportation means and operations, or in the immediate environment of the flower itself within individual packages or bulk containers with devices within the package into which the cannabis/hemp is packaged.

## 11. Special Considerations

11.1 Maintaining lower temperatures while controlling humidity to assure against condensation while packaged flower is in transit better preserves the quality of cannabis/hemp flower. Transport at the lowest feasible temperature without freezing, taking care to avoid temperature fluctuations which can promote water vapor condensation which in turn increases the risk of mold and/or rot in and on the cannabis/hemp flower.

11.1.1 Although Table 1 in Specification D8432 indicates fairly lengthy times that the stability of packaged cannabis/hemp flower is maintained, the time intervals in the table are based on consideration of the stability of the cannabinoids present. Other factors, such as appearance and texture may be impacted by the cannabis/hemp variety, by the prepackaging drying and handling steps or by the light radiation of a particular sample and these factors should be taken into consideration in estimating the shelf life in transit.

11.2 If it is anticipated that the relative humidities and temperatures outside the transit vehicle will not align with Section 7 of Specification D8432, transport in refrigerated or otherwise temperature and humidity-controlled transport vehicles should be arranged such that the standard specifications can be met. Alternatively bulk or individual flower packaging with control devices of adequate performance to maintain the specifications of Specification D8432 Section 7 should be used.

11.3 Distances covered during transit of packaged cannabis/hemp flower are not necessarily a relevant factor. The key factors of time, mean kinetic temperature, and relative humidity are covered in Section 7 of Specification D8432.

11.4 Adherence to this standard can be verified with measurement records as defined in 6.3 from measurements taken at appropriate location(s) near the cannabis/hemp flower as it is being transported.

## 12. Keywords

12.1  $a_w$ ; cannabis; cannabis flower; condensation; degradation; environmental conditions; hemp; hemp flower; human use; humidity; industrial hemp; in-transit; mold; packaged cannabis; packaged hemp; packaging materials; physical damage; preservation; quality; safety; shelf life; storage; temperature; transport conditions; transport options; transportation; water activity; water content; weight stabilization