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Safety, security and sustainability of cannabis facilities and operations —

Part 1: Requirements for the safety of cannabis buildings, equipment and oil extraction operations

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

International Workshop Agreement IWA 37 was approved at a series of workshops hosted by the Standards Council of Canada (SCC), in association with Underwriters Laboratories of Canada (ULC), held virtually between December 2020 and June 2021.

A list of all parts in the IWA 37 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

While cannabis has been fully legalized in Canada and in many states in the US, it is a new and emerging industry that is moving at a very fast pace in many other parts of the world. While legalization is being deliberated by governments and legislative bodies, companies are creating their own infrastructure in anticipation of legal approval. Meanwhile, government regulators and the societies they serve are grappling with the lack of consistent rules and guidance to deliver safety, security and sustainability of cannabis facilities and operations, while growers and producers use their own judgment on how to establish and operate facilities.

It has become very clear that the global cannabis market is opening up very rapidly. The cannabis product and the industry will become more and more ubiquitous as the global barriers start to lower and come down. If the current trend continues, it is predicted that well over one third of the globe will accommodate cannabis by 2024.

What is unique about this new and emerging industry is that it is coming from an illicit status into decriminalization and evolving into a legitimate burgeoning business. Due to its pioneering status, very little exists in terms of research, studies, historical experience and best practices. Standardization is likewise very slow on the uptake and the cannabis industry remains severely underserved.

There are therefore distinct challenges for the safety, security and sustainability of cannabis facilities and operations, which the IWA 37 series seeks to address as follows:

— Part 1 (this document): Requirements for the safety of cannabis buildings, equipment and oil extraction operations;

— Part 2: Requirements for the secure handling of cannabis and cannabis products;

— Part 3: Good production practices (GPP).

In addition to the requirements for sites, facilities, buildings, and equipment specified in this document, statutory and regulatory requirements and codes can apply.

NOTE Annex A provides information on international construction codes to consider when working with this document.

Supporting material to accompany the IWA 37 series is available at the following website: IWA 37 — Safety, security and sustainability of cannabis facilities and operations.

A list of workshop participants is available from the Standards Council of Canada (SCC).

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Safety, security and sustainability of cannabis facilities and operations —

Part 1:
Requirements for the safety of cannabis buildings, equipment and oil extraction operations

1 Scope

This document specifies a minimum level of protection and safety for buildings or parts thereof, which are used for the commercial cultivation, specific to processing of cannabis plants and cannabis products, and ancillary activities associated with cannabis plants and cannabis products.

This document specifies a minimum level of safety for the installation of devices, equipment, and systems used for cannabis cultivation, processing, and ancillary activities and addresses the risks of fire, electric shock, injury to persons, and explosion associated with these devices, equipment and systems.

This document includes minimum considerations for training of personnel and equipment maintenance.

This document specifies direction for the safe methods of extracting oil from cannabis plants, including but not limited to, initial extraction and post-processing refinement.

Where buildings or premises combine cultivation and processing of cannabis plants, including ancillary activities along with other operational activities, the requirements of this document are intended to apply to only that portion of the facility.

NOTE In many cases, a building or facility can be used for both the cultivation of cannabis plants and processing of cannabis products, along with a retail store front, call centre, or office administration space. Where such joint use activities are present in a common building, it is possible that local building or fire codes can require the installation or extension of certain life safety systems, such as fire alarm and fire sprinklers.

This document does not address the following:

— general building construction features that are normally a function of applicable codes;

— premises used exclusively for operational activities such as office space, call centres, and retail outlets, used for the distribution, marketing, or sale of cannabis;

— any use of the cannabis plant or cannabis products;

— the physiological or other attributes or effects that can result from the use of this equipment;

— the transportation of cannabis or cannabis related products;

— occupational health and safety requirements governing cannabis workers and personnel except as specifically identified in this document;

— security of the supply chain monitoring system, including cybersecurity and notifications;

— outdoor grow area (including cannabis and industrial hemp).

NOTE 1 Shipping and receiving of products from the production facility for further distribution are not considered as a retail outlet.

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NOTE 2 This document is not intended to apply to facilities that are used exclusively for operational activities such as selling, marketing, or other business administrative purposes. This can include but not be limited to, retail rental space, call centres, or other facilities that are not combined with cultivation and ancillary activities associated with the growing, processing, and storage of cannabis plants and cannabis products.

All requirements in this document are generic and intended to be applicable to all organizations in the cannabis supply chain, regardless of size and/or complexity.

2 Normative references

The following documents are referred to in the text in such a way that some, or all, of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 834-1, *Fire-resistance tests — Elements of building construction — Part 1: General requirements*

ISO/TS 5658-1, *Reaction to fire tests — Spread of flame — Part 1: Guidance on flame spread*

ISO 6183, *Fire protection equipment — Carbon dioxide extinguishing systems for use on premises — Design and installation*

ISO 7240-14, *Fire detection and alarm systems — Part 14: Design, installation, commissioning and service of fire detection and fire alarm systems in and around buildings*

ISO 11625, *Gas cylinders — Safe handling*

ISO 13824, *Bases for design of structures — General principles on risk assessment of systems involving structures*

ISO 14520-1, *Gaseous fire-extinguishing systems — Physical properties and system design — Part 1: General requirements*

ISO 16069, *Graphical symbols — Safety signs — Safety way guidance systems (SWGS)*

ISO 21542, *Building construction — Accessibility and usability of the built environment*

ISO 23601, *Safety identification — Escape and evacuation plan signs*

ISO 28802, *Ergonomics of the physical environment — Assessment of environments by means of an environmental survey involving physical measurements of the environment and subjective responses of people*

ISO 30061, *Emergency lighting*

IEC 60079-10-1, *Explosive atmospheres — Part 10-1: Classifications of areas — Explosive gas atmospheres*

IEC 60079-10-2, *Explosive atmospheres — Part 10-2: Classifications of areas — Explosive dust atmospheres*

IEC 60079-14, *Explosives atmospheres — Part 14: Electrical installations design, selection and erection*

IEC 62990-2, *Workplace atmospheres — Part 2: Gas detectors — Selection, installation, use and maintenance of detectors for toxic gases and vapours*

ANSI/CAN/UL/ULC 1389, *Standard for Safety, Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations*

NFPA 13, *Standard for the Installation of Sprinkler Systems*

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*

NFPA 1620, *Standard for Pre-Incident Planning*

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UL 867A, *Outline for Commercial/Industrial Indoor Air Quality Systems, Ozone Generating Type*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
ancillary activity
activity conducted within the premises such as, but not limited to, drying, trimming, extraction, milling, processing and storage

3.2
authority having jurisdiction
AHJ
organization (3.29), office, or individual responsible for enforcing the *requirements* (3.36) of a code or standard, or for approving equipment, materials, an installation, or a procedure

Note 1 to entry: Also referred to as “competent authority”.

[SOURCE: ISO 7076-5:2014, 3.4, modified – Note 1 to entry has been added.]

3.3
cannabis
genus of flowering plants made up of many different phytocannabinoids and chemical compounds

Note 1 to entry: Research into cannabis by governing bodies and *organizations* (3.29) is ongoing around the world, and drug classifications are constantly under review. Regulation of cannabis legalization frameworks can vary between jurisdictions, based on the levels of tetrahydrocannabinol (THC) available in the plant.

3.4
cannabis derivative
secondary *product* (3.34) that can be extracted or obtained from a *cannabis* (3.3) biomass

Note 1 to entry: Classification of synthetically derived cannabinoids can vary between jurisdictions.

3.5
cannabis product
packaged goods containing *cannabis* (3.3) or *cannabis derivative* (3.4), available in multiple formats for commercial and/or retail distribution

3.6
closed-loop system
interconnected system of piping and vessels where solvent/process is contained within a closed system, not open to atmosphere while processing material

Note 1 to entry: Closed-loop systems operate at atmospheric pressure, under vacuum or under pressure.

3.7
combustible dust
finely divided solid particles, 500 µm or less in nominal size, which may form explosive mixtures with air at standard atmospheric pressure and temperatures

Note 1 to entry: This includes dust and grit as defined in ISO 4225.

Note 2 to entry: The term 'solid particles' is intended to address particles in the solid phase but does not preclude a hollow particle.

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[SOURCE: ISO/IEC 80079-20-2:2016, 3.1]

3.8
combustible liquid
liquid having a flash point at or above 37,8 °C and below 93,3 °C

3.9
competence
ability to apply knowledge and skills to achieve intended results

[SOURCE: ISO 22000:2018, 3.4]

3.10
contamination
introduction or occurrence of a contaminant including a *safety hazard* (3.39) in a *product* (3.34) or processing environment

[SOURCE: ISO 22000:2018, 3.6]

3.11
crude oil
oil that has been extracted from a *cannabis* (3.3) plant biomass that can undergo further refinement

3.12
crystallization
process (3.33) of purifying a chemical substance; or the formation of solid forms or a crystal via organized structures of atoms/molecules

Note 1 to entry: The formation of crystals in a solution is known as precipitation; which can be triggered by changes in temperature and/or pressure resulting in nucleation and ultimately crystal growth.

3.13
cultivation
process (3.33) of growing *cannabis* (3.3), including drying, trimming, milling, and storing

3.14
decarboxylation
chemical reaction using temperature and time that removes a carboxyl group and releases carbon dioxide

3.15
dewar vessel
glass or metal container designed like a vacuum bottle typically used for storing liquefied gases

3.16
distillation
further refinement of the cannabinoid extract involving the application of heat and vacuum to target different boiling points of compounds so as to remove impurities and increase the active compound potency of the extract

Note 1 to entry: Short path bench top apparatuses or wiped and rolled film evaporators are examples of common distillation equipment.

3.17
extraction
process (3.33) where a substance is removed or separated from other compounds, a solution or a mixture

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3.18
filtration
process (3.33) of separating suspended solid matter from a liquid via a physical, biological, or chemical filter medium that only allows liquid to pass through

Note 1 to entry: The resulting fluid is called the filtrate, which will contain a reduced concentration of the targeted solid matter trapped behind the filter medium.

3.19
flammable gas
substance that exists in the gaseous state at normal atmospheric temperature and pressure and is capable of being ignited and burned when mixed with the proper proportions of air, oxygen or other oxidizers

3.20
flammable liquid
liquid having a flash point below 37,8 °C and having a vapour pressure not more than 275,8 kPa (absolute) at 37,8 °CNote 1 to entry: The standard test method for vapour pressure of petroleum *products* (3.34) is the Reid Method, as determined by ASTM D323.

3.21
flammable solvent
flammable liquid, *combustible liquid* (3.8) or a flammable gas capable of dissolving another substance to form a uniformly dispersed mixture at the molecular or ionic level

3.22
food
substance (ingredient), whether processed, semi-processed or raw, which is intended for consumption, and includes drink, chewing gum and any substance which has been used in the manufacture, preparation or treatment of "food" but does not include cosmetics or tobacco or substances (ingredients) used only as drugs

[SOURCE: ISO 22000:2018, 3.18, modified — The original Note to entry has been deleted.]

3.23
greenhouse
building that can have unlimited size, and with more than 50 % of surface area of roofs and/or walls being transparent and/or translucent for the *cultivation* (3.13) of *cannabis* (3.3) plants and other cultivation activities

3.24
grow area
area of the site where *cannabis* (3.3) plants are cultivated, harvested or propagated

3.25
lab scale operation
small scale processing, typically less than commercially viable scale in a given industry

Note 1 to entry: Small quantities of material are processed in these operations, which are often used for research and development and/or proof of concept for pilot, demonstration, or industrial-scale viability. The containers used for reactions, transfers, and other handling of chemicals are typically designed to be easily and safely manipulated by one person.

3.26
lower flammable limit
LFL
concentration of a flammable gas or vapour in air, below which an explosive gas atmosphere does not form

[SOURCE: ISO/IEC 80079-20-1:2017, 3.6.1, modified — The notes to entry have been deleted.]

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3.27
monitoring
determining the status of a system, a *process* (3.33) or an activity

Note 1 to entry: To determine the status, there may be a need to check, supervise or critically observe.

Note 2 to entry: In the context of *cannabis* (3.3) *safety* (3.38), monitoring is conducting a planned sequence of observations or measurements to assess whether a process is operating as intended.

Note 3 to entry: Distinctions are made in this document between the terms *validation* (3.40), monitoring and *verification* (3.41):

— validation is applied prior to an activity and provides information about the capability to deliver intended results;

— monitoring is applied during an activity and provides information for action within a specified time frame;

— verification is applied after an activity and provides information for confirmation of conformity.

[SOURCE: ISO 22000:2018, 3.27, modified — The words "food safety" have been replaced with "cannabis safety" in Note 2 to entry.]

3.28
non-polar solvent
flammable liquid or flammable gas that does not readily mix with water without the use of chemical additives, such as emulsifying agents.

Note 1 to entry: Flammability is a concern at all concentrations in both liquid and gaseous phases.

Note 2 to entry: Non-miscible flammable liquids (often referred to as non-polar solvents) are oils (vegetable and petroleum based) and flammable petroleum gases. Petroleum based compounds can include liquids such as naphtha, gasoline etc. as well as gases such as butane, propane (LPG) etc.

3.29
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives

Note 1 to entry: The concept of organization includes, but is not limited to sole-trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

[SOURCE: ISO 22000:2018, 3.31]

3.30
personal protective equipment
PPE
device or appliance designed to be worn by an individual for protection against one or more health and *safety hazards* (3.39)

Note 1 to entry: PPE includes, but is not limited to, gowns, gloves, respirators, safety glasses, helmets, and goggles.

Note 2 to entry: While generally not considered PPE, masks (and face coverings) can provide a level of protection for the user, in addition to their primary purpose as a public health measure to control the spread of transmission and infection.

Note 3 to entry: National regulations can apply with respect to PPE.

[SOURCE: ISO 15384:2018, 3.12, modified — The words "or held" have been removed from the definition and the Notes to entry have been added.]

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3.31
polar solvent
flammable liquid that mixes in all proportions with water at standard temperature and pressure without the use of chemical additives, such as emulsifying agents

Note 1 to entry: Water miscible flammable liquids (often referred to as polar solvents) are typically alcohol, acetone or ketone-based liquids.

Note 2 to entry: As an example, beverages containing ethanol such as beer and wine will have an alcohol volume concentration (ABV) of less than 20 % and are not seen as a special fire protection hazard. Spirits will have greater than 20 % ABV and are seen as a special hazard with the *risk* (3.37) level increasing proportionately with concentration.

3.32
post-processing
process (3.33) that occurs after the initial plant oil extraction process, when the concentrate is manufactured into food, vape cartridges, capsules, and different consumer packaged goods

3.33
process
set of interrelated or interacting activities which transforms inputs to outputs

[SOURCE: ISO 22000:2018, 3.36]

3.34
product
output that is a result of a *process* (3.33)

Note 1 to entry: A product can be a service.

[SOURCE: ISO 22000:2018, 3.37]

3.35
protected area
protected premises, or an area within, that is provided with means to prevent an unwanted event

Note 1 to entry: Protected areas are imposed in the low security level.

3.36
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for the *organization* (3.29) and interested parties that the need or expectation under consideration is implied.

Note 2 to entry: A specified requirement is one that is stated, for example in documented information.

[SOURCE: ISO 22000:2018, 3.38]

3.37
risk
effect of uncertainty

Note 1 to entry: An effect is a deviation from the expected – positive or negative.

Note 2 to entry: Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

Note 3 to entry: Risk is often characterized by reference to potential "events" (as defined in ISO Guide 73:2009, 3.5.1.3) and "consequences" as defined in ISO Guide 73:2009, 3.6.1.3), or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated "likelihood" (as defined in ISO Guide 73:2009, 3.6.1.1) of occurrence.

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[SOURCE: ISO 22000:2018, 3.39, modified — The original Note 5 to entry has been deleted.]

3.38
safety
assurance that the *product* (3.34) will not cause an adverse health effect for the consumer when it is prepared and/or used according to its intended use

Note 1 to entry: Safety is related to the occurrence of *safety hazards* (3.39) in end products and does not include other health aspects.

3.39
safety hazard
source or situation with the potential to cause an adverse health effect

Note 1 to entry: The term hazard is not to be confused with the term *risk* (3.37) which, in the context of *safety* (3.38), means a function of the probability of an adverse health effect (e.g. becoming diseased) and the severity of that effect (e.g. death, hospitalization) when exposed to a specified hazard.

Note 2 to entry: Safety hazards include allergens and radiological substances.

[SOURCE: ISO 22000:2018, 3.22, modified — The word "food" has been deleted from the term and from Notes 1 and 2 to entry; the words "biological, chemical or physical agent in food" have been replaced with "source or situation" in the definition; the original Notes 3 and 4 to entry have been deleted.]

3.40
validation
obtaining evidence that a control measure (or combination of control measures) will be capable of effectively controlling the significant *safety hazard* (3.39)

Note 1 to entry: Validation is performed at the time a control measure combination is designed, or whenever changes are made to the implemented control measures.

Note 2 to entry: Distinctions are made in this document between the terms validation, *monitoring* (3.27) and *verification* (3.41):

— validation is applied prior to an activity and provides information about the capability to deliver intended results;

— monitoring is applied during an activity and provides information for action within a specified time frame;

— verification is applied after an activity and provides information for confirmation of conformity.

[SOURCE: ISO 22000:2018, 3.43, modified — The word "food" has been deleted from the definition.]

3.41
verification
confirmation, through the provision of objective evidence, that specified *requirements* (3.36) have been fulfilled

Note 1 to entry: Distinctions are made in this document between the terms *validation* (3.40), *monitoring* (3.27) and verification:

— validation is applied prior to an activity and provides information about the capability to deliver intended results;

— monitoring is applied during an activity and provides information for action within a specified time frame;

— verification is applied after an activity and provides information for confirmation of conformity.

[SOURCE: ISO 22000:2018, 3.45]

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3.42
winterization
fractionation *process* (3.33) that uses a solvent and cold temperatures to separate lipids and other undesired constituents

4 Buildings

4.1 General

4.1.1 This clause addresses facilities used for the cultivation, production, processing, or combination thereof, of cannabis.

NOTE Additional information can be found in CAN/ULC-S4400 and ANSI/CAN/UL/ULC 1389.

4.1.2 The buildings or parts thereof addressed in this document can be classified as any of the following:

a) industrial;

b) commercial;

c) agricultural;

d) farm building;

e) any combination of a) to d).

4.1.3 Cannabis extraction processes using flammable solvents shall not be conducted within a building containing any of the following occupancies:

a) assembly;

b) detention;

c) treatment or care;

d) residential.

4.1.4 Buildings and facilities or parts thereof, that are used for ancillary activities, related to the cultivation, production, processing or storage of cannabis and cannabis related products, shall be classified in accordance with their occupancy.

NOTE 1 Other building and occupancy classifications can be identified by applicable codes and regulations, or by the authority having jurisdiction (AHJ).

NOTE 2 Occupancies are classified in accordance with local codes and regulations where these exist. In their absence users of this document can reference other internationally recognized documents, e.g. NFPA 5000, ICC International Building Code[22], National Building Code of Canada[23].

4.2 Building design

4.2.1 The processing of cannabis, including extraction activities, shall be carried out in building occupancies, or portions thereof, approved for such use.

NOTE Plant oil extraction processes using flammable solvents can result in the release of flammable vapours into the surrounding atmosphere as a normal part of the overall extraction process. As a result, it is important that such areas within a building are designed accordingly.

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