



Cathedral City Fire Department

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Technical Policy

Title: Plant Processing and Extraction Facilities		
Technical Policy: # TP 17-003	Effective Date: 07/10/2017	Revised Date: N/A
Code References: 2016 California Fire Code, Sec. 1.11.2.4, 102.9, 104.1, and 104.9		

I. **PURPOSE:**

The Cathedral City Fire Department (CCFD) has prepared this policy to provide guidance to building officials, contractors, engineers, consultants and the general public on local interpretations and practices that are considered to be in compliance with the 2016 California Fire Code (CFC). This policy is intended to provide information on plant processing and extraction facilities. The requirements of this policy shall not be construed as altering any existing code, law or regulation which may require fire protection features not covered or alluded to in these requirements, nor shall they waive any requirements of any code, law or regulation. The reader is cautioned that the guidance detailed in this policy may or may not apply to their specific situation, and that the Cathedral City Fire Department retains final authority to determine compliance.

II. **SCOPE:**

This policy covers the installation, maintenance, operation and permitting requirements as they pertain to Plant Processing and Extraction Facilities in new and existing facilities under the jurisdiction of the CCFD in accordance with CFC Sections 1.11.2.4, 102.9, 104.1, and 104.9. This policy applies to the following:

- The extraction process, including but not limited to, the act of extraction of the oils and fats by use of a solvent, desolventizing of the raw material and production of the miscella, distillation of the solvent from the miscella and solvent recovery.
 - The use, storage, transfilling, and handling of hazardous materials in these facilities
- A. Existing buildings or facilities where the processing or extraction of plants is introduced, changed, or where the medium of extraction or solvent is changed shall comply with this Technical Policy.
- B. Design and installation shall comply with the applicable provisions of the California Construction Codes, as amended, and this policy. The most restrictive requirements shall govern.

III. **CODES AND STANDARDS**

This policy is based on the 2016 California Fire Code (CFC), Chapter 1, Section 102.9, Matters not provided for; Chapter 9, Fire Protection Systems; and Part V (Chapters 50 through 67) Hazardous Materials.

Specifically, CFC Section 102.9 permits the Fire Code Official to determine requirements that are essential for the public safety of an existing or proposed activity, building or structure, or for the safety of the occupants thereof, which are not specifically provided for by the CFC.

The City of Cathedral City adopted the 2016 CFC which does not currently provide specific regulatory provisions for plant processing and extraction facilities. This Technical Policy is based upon the recently incorporated provisions to the 2018 International Fire Code including, but not limited to, a new Section 916 Gas Detection Systems and a new Chapter 39 for Plant Processing and Extraction Facilities. The California State Fire Marshal is supplementing the 2016 California Building Standards Code with these 2018 International Fire Code provisions which should be effective statewide July 2018.

IV. DEFINITIONS

DESOLVENTIZING The act of removing a solvent from a material.

GAS DETECTION SYSTEM A system or portion of a combination system that utilizes one or more stationary sensors to detect the presence of a specified gas at a specified concentration and initiate one or more responses required by this Technical Policy such as notifying a responsible person, activating an alarm system, or activating or deactivating equipment. A self-contained gas detection and alarm device is not classified as a gas detection system.

MISCELLA A mixture, in any proportion, of the extracted oil or fat and the extracting solvent.

V. PERMITS AND INSPECTIONS

A. CONSTRUCTION PERMITS

1. **Plant extraction systems.** A construction permit is required for installation of or modification to a plant extraction system. Maintenance performed in accordance with the CFC is not considered to be modification and does not require a construction permit.
2. **Gas detection systems.** A construction permit is required for installation of or modification to gas detection systems. Maintenance performed in accordance with the CFC is not considered a modification and shall not require a permit.
3. **Requirements.**
 - a) The Cathedral City Fire Department must review all plant extraction system permit applications.
 - b) Applicant must comply with any additional permit applications and review requirements of the Building and Safety Dept./Division.
 - c) Applicable plan review and permit fees shall apply.
 - d) Construction permits shall be issued to licensed contractors unless otherwise approved by the Fire Code Official.
 - e) Construction drawings and specifications shall bear the seal and signature of a licensed California professional engineer/architect who prepared the drawings/specifications and shall be complete and of sufficient clarity to indicate the entire work proposed and show in detail that the plant extraction system conforms to the provisions of this policy, the California Fire and Building Codes and relevant laws, ordinances, rules and regulations. Each set of drawings and specifications shall, at a minimum, contain the following information, architectural, structural, mechanical, electrical drawings, specifications and analysis:
 - i. Exact address, legal description and location of the work performed.
 - ii. Name and address of the owner.
 - iii. Name and address of the person or firm responsible for the preparation of the drawings and specifications. The seal and signature of the California licensed architect and/or engineer responsible for the preparation of the drawings and specifications.
 - iv. Two complete sets of construction documents showing the construction of architectural, structural, mechanical, plumbing and electrical arrangements.
 - v. One copy of specifications or notes that clearly describe the type, quality and finish of materials and the method of assembly, erection and installation of equipment to be installed with proper reference to accepted standards.
 - vi. Except for entirely interior installations, a plot plan showing the location of the proposed construction (i.e., tanks) and the location of every adjacent existing building on the property, roads, walks, utilities and other site improvements, all property lines, streets, alleys, easements and other public areas.

- vii. Bulk tank installations (Carbon Dioxide or Liquid Propane Gas [LPG]) may require an engineered structural foundation with a separate tank installation permit. Contact the Building and Safety Dept/Division with jurisdiction to determine requirements.
- viii. Total aggregate quantity of hazardous materials (solvents, etc.) in storage, use open and use closed. Provide complete Hazardous Material Inventory Statement (HMIS).
- ix. Location of the room where the plant extraction operation will be conducted. Identify whether the room is at grade or below grade.
- x. Location of containers (Carbon Dioxide, Ethanol **or** LPG) relative to equipment, building openings and means of egress.
- xi. Manufacturer's specifications and pressure rating, including cut sheets, of all piping and tubing to be used.
- xii. A piping and instrumentation diagram that shows piping support and remote fill connections.
- xiii. Details of container venting, including but not limited to vent line size, material and termination location.
- xiv. Alarm and detection system and equipment.
- xv. Seismic support for containers.

B. OPERATIONAL PERMITS

1. Where required by the Fire Code Official, operational permits shall be issued upon approval, issuance, and final inspections of required construction permits.
2. An annual operational permit may be required to use a plant extraction system in accordance with the CFC and this Technical Policy.
3. Operational permits, if required, shall be posted on site.

C. SITE INSPECTION

The Cathedral City Fire Department (CCFD) and the Building and Safety Dept/Division shall inspect and witness acceptance testing of the installation. Contact CCFD and the Building and Safety Dept/Division to confirm type and frequency of inspections required. Compliance with all California Fire Code requirements shall be maintained at all times.

VI. REQUIREMENTS

A. PROCESSING AND EXTRACTION

1. **Construction.** Processing shall be located in a building complying with the California Building Code.
2. **Prohibited occupancies.** Extraction processes utilizing flammable gasses or flammable cryogenic fluids shall not be located in any building containing a Group A, E, I or R occupancy.
3. **Location.** The extraction equipment and extraction process utilizing hydrocarbon solvents shall be located in a room or area dedicated to extraction.
4. **Post-process purification and winterization.** Post-processing and winterization involving the heating or pressurizing of the miscella to other than normal pressure or temperature shall be approved and performed in an appliance listed for such use. Domestic or commercial cooking appliances shall not be used.
5. **Industrial ovens.** The use of industrial ovens shall comply with CFC Chapter 30.

6. **Use of flammable and combustible liquids.** The use of flammable and combustible liquids for liquid extraction processes where the liquid is boiled, distilled, or evaporated shall be located within a hazardous exhaust fume hood, rated for exhausting flammable vapors. Electrical equipment used within the hazardous exhaust fume hood shall be rated for use in flammable atmospheres. Heating of flammable or combustible liquids over an open flame is prohibited.

Exception: The use of a heating element not rated for flammable atmospheres approved where documentation from the manufacture or approved testing laboratory indicates it is rated for heating of flammable liquids.

7. **Liquefied Petroleum Gas.** Liquefied-petroleum gases shall not be released to the atmosphere.

Exception: LPG gas may be released to the atmosphere in accordance with the 2014 edition of NFPA 58 Section 7.3.

B. SYSTEMS AND EQUIPMENT

1. **General requirements.** Systems and equipment used with the processing and extraction of oils and products from plants shall comply with this Technical Policy, CFC Section 5003.2, other applicable provisions of the CFC, the California Building Code, and the California Mechanical Code.
2. **Systems and equipment.** Systems or equipment used for the extraction of oils from plant material shall be listed or approved for the specific use. If the system used for extraction of oils and products from plant material is not listed, then the system shall be reviewed by a Licensed California Professional Engineer. The Licensed California Professional Engineer shall review and consider any information provided by the system's designer or manufacturer. For systems and equipment not listed for the specific use, a technical report in accordance with the below requirements shall be prepared and submitted to the fire code official for review and approval. The firm or individual preparing the technical report shall be approved by the fire code official prior to performing the analysis.
3. **Technical report.** The technical report which has been reviewed and approved by the fire code official, as required by the section above is required prior to the equipment being located or installed at the facility. The report shall be prepared by a Licensed California Professional Engineer or other professional approved by the fire code official.
4. **Report Content.** The technical report shall contain all of the following:
 - a) Manufacturer information.
 - b) Preparer of record on technical report.
 - c) Date of review and report revision history.
 - d) Signature page shall include all of the following:
 - i. Author of the report
 - ii. Date of report
 - iii. Date, seal and signature of the Licensed California Professional Engineer of record performing the design or peer review
 - e) Model number of the item evaluated. If the equipment is provided with a serial number, the serial number shall be included for verification at time of site inspection.
 - f) Methodology of the design or peer review process used to determine minimum safety requirements. Methodology shall consider the basis of design, and shall include a code analysis and code path to demonstrate the reason as to why specific code or standards are applicable or not.

- g) Equipment description. A list of every component and sub-assembly (fittings, hose, quick disconnects, gauges, site glass, gaskets, valves, pumps, vessels, containers, switches, etc.) of the system or equipment, indicating the manufacturer, model number, material, and solvent compatibility. Manufacture' data sheets shall be provided.
 - h) A general flow schematic or general process flow diagram of the process. Post-processing or winterization shall be included in this diagram. All primary components of the process equipment shall be identified and match the equipment list required in Item 7. Operating temperatures, pressures, and solvent state of matter shall be identified in each primary step or component. A piping and instrumentation diagram (PID or PI&D) shall be provided.
 - i) Analysis of the vessel(s) if pressurized beyond standard atmospheric pressure. Analysis shall include purchased and fabricated components.
 - j) Structural analysis for the frame system supporting the equipment.
 - k) Process safety analysis of the extraction system, from the introduction of raw product to the end of the extraction process.
 - l) Comprehensive process hazard analysis considering failure modes and points of failure throughout the process. The process hazard analysis shall include a review of emergency procedure information provided by the manufacturer of the equipment or process and not that of the facility, building or room.
 - m) Review of the assembly instructions, operational and maintenance manuals provided by the manufacturer.
 - n) List of references used in the analysis.
5. **Site inspection.** Prior to operation of the extraction equipment, where required by the fire code official, the Licensed California Professional Engineer of record or approved professional, as required in this Technical Policy shall inspect the site of the extraction process once equipment has been installed for compliance with the technical report and the building analysis. The Licensed California Professional Engineer of record or approved professional shall provide a report of findings and observations of the site inspection to the fire code official prior to the approval of the extraction process. The field inspection report authored by the engineer of record shall include the serial number of the equipment used in the process and shall confirm the equipment installed is the same model and type of equipment identified in the technical report.

C. SAFETY SYSTEMS

1. **Gas detection system.** Rooms in which extraction processes utilizing flammable gases as solvents, are conducted shall be provided with a gas detection system that complies with this Technical Policy. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL).
 - a. **System design.** The flammable gas detection system shall be listed or approved and shall be calibrated to the types of fuels or gases used for the extraction process. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL).
 - b. **Gas detection system components.** Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.
 - c. **Operation.** Activation of the gas detection system shall result in all the following:
 - d. Initiation of distinct audible and visual alarm signals in the extraction room.

- e. Deactivation of all heating systems located in the extraction room.
 - f. Activation of the mechanical ventilation system, where the system is interlocked with gas detection.
 - g. **Failure of the gas detection system.** Failure of the gas detection system shall result in the deactivation of the heating system, activation of the mechanical ventilation system where the system is interlocked with the gas detection system and cause a trouble signal to sound in an approved location.
 - h. **Interlocks.** All electrical components within the extraction room shall be interlocked with the gas detection system. Activation of the gas detection system shall disable all light switches and electrical outlets.
6. **Emergency shutoff.** Extraction processes utilizing gaseous hydro-carbon based solvents shall be provided with emergency shutoff systems in accordance with CFC Section 5803.1.3.

D. GAS DETECTION SYSTEMS

1. **Gas detection systems.** Gas detection systems shall comply with this Technical Policy and the CFC.
2. **Permits.** Permits shall be required as set forth in this Technical Policy and the CFC.
 - a) **Construction documents.** Documentation of the gas detection system design and equipment to be used that is adequate to demonstrate compliance with the requirements of this Technical Policy and the CFC shall be provided with the application for permit.
3. **Equipment.** Gas detection system equipment shall be designed for use with the gases being detected and shall be installed in accordance with manufacturers' instructions.
4. **Power connections.** Gas detection systems shall be permanently connected to the building electrical power supply or shall be permitted to be cord connected to an unswitched receptacle using an approved restraining means that secures the plug to the receptacle.
5. **Emergency and standby power.** Standby or emergency power shall be provided or the gas detection system shall initiate a trouble signal at an approved location if the power supply is interrupted.
6. **Sensor locations.** Sensors shall be installed in approved locations where leaking gases are expected to accumulate.
7. **Gas sampling.** Gas sampling shall be performed continuously. Sample analysis shall be processed immediately after sampling, except as follows:
 - a) For toxic gases that are not HPM, sample analysis shall be performed at intervals not exceeding 5 minutes, in accordance with CFC Section 6004.2.2.7.
 - b) Where a less frequent or delayed sampling interval is approved.
8. **System activation.** A gas detection alarm shall be initiated where any sensor detects a concentration of gas exceeding the following thresholds:
 - a) For flammable gases, a gas concentration exceeding 25 percent of the lower flammable limit (LFL).
 - b) For nonflammable gases, a gas concentration exceeding one half of the IDLH, unless a different threshold is specified by Section C of this Technical Policy or CFC requiring a gas detection system.

Upon activation of a gas detection alarm, alarm signals or other required responses shall be as specified by the CFC or this Technical Policy requiring a gas detection system. Audible and visible alarm signals associated with a gas detection alarm shall be distinct from fire alarm and carbon monoxide alarm signals.

9. **Signage.** Signs shall be provided adjacent to gas detection system alarm signaling devices that advise occupants of the nature of the signals and actions to take in response to the signal.
10. **Fire alarm system connections.** Gas sensors and gas detection systems shall not be connected to fire alarm systems unless approved and connected in accordance with the fire alarm equipment manufacturers' instructions.
11. **Inspection, testing and sensor calibration.** Inspection and testing of gas detection systems shall be conducted not less than annually. Sensor calibration shall be confirmed at the time of sensor installation and calibration shall be performed at the frequency specified by the sensor manufacturer.