REPORT NUMBER: 201810001 Rev. 3
MODELS: EB10910, EXB10920, EXB151426, & SHIPPING CONTAINER EXTRACTION BOOTHS (8X20, 2X8X20, 8X40)

Engineering Peer Review

for Extraction Facilities

Prepared for

C1D1 LABS, LLC

Review date: February 5, 2019

Pressure Safety Inspectors, LLC
3750 Dacoro Lane, Unit 155
Castle Rock, CO 80109

Signature Page

The designs of the C1D1 Labs, LLC models listed have been found suitable provided that the equipment is fabricated and assembled using the components listed on the design documentation provided for this review. ***This report offers conditional approval of the design. PSI has determined that the models listed are safe for use so long as the following conditions are met:***

1. *At installation, the equipment must be successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC).*
2. *Only approved (3rd party engineering review) LPG extraction equipment may be used.*
3. *Upon installation, the engineer of record for the extraction equipment must perform a field verification to ensure compliance with the engineering peer review of the LPG extraction equipment. (IFC 3904.4) (NFPA 1: 38.6.1.5.6.1)*
4. *All "requirements at installation" as outlined in this document, have been met.*

This Engineering Peer Review was prepared for:

Original Equipment Manufacturer (OEM):	**C1D1 Labs, LLC** **4460 Redwood Hwy, San Rafael, CA 94903**
For the following Model Numbers:	EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40)

Authored by: Date: Signature:	Jarrod Clark, PE February 5, 2019	NC/NM/TN
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Report Number: **201810001 Rev. 3**

Revision History

Revision	Date	Description
0	October 30, 2018	Original Release
1	November 7, 2018	Added model EXB151426
2	November 26, 2018	Added NY, SC, and TX requirements; Updated egress requirements; Updated EB10910 and EXB10920 plenum designs
3	February 5, 2019	Add Shipping Container Extraction Booths; Add Shipping Container Extraction Booths plenum designs

Engineer Seals

State of Arizona

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by an Arizona Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- Arizona Fire Code 2016
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of California

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a California Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- California Fire Code 2016
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Colorado

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Colorado Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- International Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Florida

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Florida Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- International Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Hawaii

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Hawaii Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- National Fire Protection Association (NFPA) 1, Fire Code, 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Maryland

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Maryland Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- National Fire Protection Association (NFPA) 1, Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 25485; Expiration Date: 08-18-2020

State of Massachusetts

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Massachusetts Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- National Fire Protection Association (NFPA) 1, Fire Code, 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Maine

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Maine Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- National Fire Protection Association (NFPA) 1, Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Michigan

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Michigan Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- National Fire Protection Association (NFPA) 1, Fire Code, 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Nevada

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Nevada Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- International Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of New York

C1D1 Labs, LLC model number EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) has been evaluated by a New York Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified by PSI to confirm the equipment is installed in accordance with this report. All models were reviewed using the following internationally recognized codes and standards:

- New York State Uniform Fire Prevention and Building Code 2017
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

Notice: It is a violation of Section 7209 of Article 145 of the New York State Education Law for any person to alter this document once signed and sealed without the express written consent of the engineer of record.

State of Ohio

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by an Ohio Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- International Fire Code 2015
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Oregon

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by an Oregon Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- Oregon Fire Code 2014
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Pennsylvania

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Pennsylvania Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- International Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of South Carolina

C1D1 Labs, LLC model number EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) has been evaluated by a South Carolina Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified by PSI to confirm the equipment is installed in accordance with this report. All models were reviewed using the following internationally recognized codes and standards:

- International Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Texas

C1D1 Labs, LLC model number EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) has been evaluated by a Texas Professional Engineer and been found suitable for use, providing at installation, the equipment is successfully field verified by PSI to confirm the equipment is installed in accordance with this report. All models were reviewed using the following internationally recognized codes and standards:

- International Fire Code 2018
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Washington

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Washington Professional Engineer and found to be professional grade, commercially manufactured, designed and fabricated as described in (WAC) 314-55-104 (4); providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- Washington Fire Code 2015 (WAC 51-54A)
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

State of Washington

C1D1 Labs, LLC model numbers EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been evaluated by a Washington Professional Engineer and found to be professional grade, commercially manufactured, designed and fabricated as described in (WAC) 314-55-104 (4); providing at installation, the equipment is successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC). All models were reviewed using the following internationally recognized codes and standards:

- Washington Fire Code 2015 (WAC 51-54A)
- NFPA 58 Liquefied Petroleum Gas Code 2017
- NFPA 30, Flammable and Combustible Liquids Code 2015

Table of Contents

Executive Summary

The designs of the C1D1 Labs, LLC models listed have been found suitable provided that the equipment is fabricated and assembled using the components listed on the design documentation provided for this review. ***This report offers conditional approval of the design. PSI has determined that the models listed are safe for use so long as the following conditions are met:***

1. *At installation, the equipment must be successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC).*
2. *Only approved (3rd party engineering review) LPG extraction equipment may be used.*
3. *Upon installation, the engineer of record for the extraction equipment must perform a field verification to ensure compliance with the engineering peer review of the LPG extraction equipment. (IFC 3904.4) (NFPA 1: 38.6.1.5.6.1)*
4. *All "requirements at installation" as outlined in this document, have been met.*

C1D1 Labs, LLC models EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are modular laboratories designed to house Liquefied Petroleum Gas (LPG) *or* Class IB flammable liquids extraction or post extraction equipment. The modular laboratories are intended to be installed inside an existing structure. The EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are only intended for extraction operations using *approved*[1] LPG extraction equipment *or* post extraction processing using Class IB flammable liquids. LPG solvent extraction equipment shall not be used concurrently with any other process.

This report does not focus on standard International Building Code or California Building Code requirements for permanent or temporary sturctures. This report is intended to analyze the modular laboratory for compliance with Codes and Standards for LPG extraction and Ethanol Post Extraction Processing facilities including:

- *Arizona Fire Code 2016 Edition (Based upon IFC 2012)*
- *California Fire Code 2016 (Based upon IFC 2015)*
- *International Fire Code (IFC) 2018*
- *New York State Uniform Fire Prevention and Building Code 2017*
- *Oregon Fire Code 2014 (Based upon IFC 2012)*

[1] LPG extraction equipment used in the processing of marijuana and/or hemp shall be listed by a Nationally Recognized Testing Laboratory (NRTL) or approved. At the time of this writing, there is no UL procedure for the listing of LPG extraction equipment and therefore all extraction equipment shall be either designed by, or reviewed by, a licensed Professional Engineer. Upon installation, the engineer of record for the extraction equipment must perform a field verification to ensure compliance with the engineering peer review of the LPG extraction equipment. (IFC 3904.4) (NFPA 1: 38.6.1.5.6.1)

- *Washington Fire Code 2015 (WAC 51-54A, Based upon IFC 2015)*
- *NFPA 1 Fire Code 2018 Edition*
- *NFPA 58 Liquefied Petroleum Gas Code 2017*
- *NFPA 30, Flammable and Combustible Liquids Code 2015*
- *NFPA 70 National Electric Code 2014*

C1D1 Labs, LLC models EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are:

- Commercially manufactured
- Safe for its intended use
- Built to the codes of recognized and generally accepted good engineering practices

The EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been reviewed by a licensed Professional Engineer and been found to be professional grade, commercially manufactured, designed and fabricated in accordance with internationally recognized codes and standards. PSI has reviewed the documentation supplied by C1D1 Labs, LLC and has determined that the EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are safe for use so long as the following conditions are met:

1. At installation, the equipment must be successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC).

2. Only approved (3rd party engineering review) LPG extraction equipment may be used.

3. Upon installation, the engineer of record for the extraction equipment must perform a field verification to ensure compliance with the engineering peer review of the LPG extraction equipment (IFC 3904.4) (NFPA 1: 38.6.1.5.6.1).

4. All “requirements at installation” as outlined in this document, have been met.

Methodology

An Engineering Peer Review (EPR) otherwise known as an independent design verification, is a focused, in-depth technical review by a Professional Engineer. The purpose of an EPR is to add value and reduce risk through expert knowledge infusion, confirmation of approach, and specific recommendations. An EPR provides a penetrating examination of design, analysis, manufacturing, test and operational details, drawings, processes and data. PSI will review all relevant design documents, including all:

- Design inputs
  - Performance criteria
  - Service conditions
  - Working fluids
  - Boundaries for Pressures, Temperatures, and Flows
- Process Flow Diagram (PFD), and/or Piping and Instrumentation Diagram (P&ID)
  - Diagrams showing all system pressure and control components
  - Illustrates the control ties between components
  - Provides summary of major mechanical items (e.g., vessels, pumps, heaters, chillers, etc.)
- Material Take-Offs (MTO)/Bills of Material (BOM)
  - Identification of components and subassemblies
- Vendor Cutsheets
  - Vendor information for purchased components
- Detail design drawings
  - Materials of Construction (MOC)
  - Sizes and thicknesses
- Calculations
  - Electrical loads
  - Pressure components
- Specifications
  - Performance-based requirements for purchased components (e.g., “vessels shall be suitable for 100 psig operation at 250°F with LPG”)
  - Compliance-based requirements for purchased or fabricated components (e.g., “vessels shall be type 304L stainless steel, 3 inch outside diameter with 0.188 inch wall thickness, fabricated in accordance with ASME Boiler and Pressure Vessel Code Section VIII Division 1”)
- Procedures
  - Quality Assurance (governing QA Plan, if any)
  - Fabrication procedures (welding, examination, testing)

  - Material traceability (control of items before, during, after fab)
  - Configuration control (verification item conforms to design)
- Codes and standards
  - Governing Codes or Standards, if any
- Factory Acceptance Tests (FAT)
  - Test plan
  - Test documentation
  - 3rd Party testing or certification (ETL/UL)
- Other relevant design documents used during the design process

The appropriate governing codes are selected based upon the service conditions provided by the equipment manufacturer. Each code is then analyzed for specific requirements. The equipment is then compared to the code requirements as an assembled unit and on an individual component level. Once the equipment has been analyzed in accordance with the governing codes, any deficiencies are reported as either Findings or Observations.

A Finding is defined as anything that could adversely affect safety as related to products, persons or property; or impact the usability of the product. An Observation is defined as a recommendation for process or design improvements, but does not adversely affect safety of the system. Any unresolved Findings described in this report will need to be resolved either through testing (by others) or replacement of affected components (by others) for the equipment to be considered safe for use.

Equipment Description

The designs of the C1D1 Labs, LLC models listed have been found suitable provided that the equipment is fabricated and assembled using the components listed on the design documentation provided for this review. ***This report offers conditional approval of the design. PSI has determined that the models listed are safe for use so long as the following conditions are met:***

1. *At installation, the equipment must be successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC).*
2. *Only approved (3rd party engineering review) LPG extraction equipment may be used.*
3. *Upon installation, the engineer of record for the extraction equipment must perform a field verification to ensure compliance with the engineering peer review of the LPG extraction equipment. (IFC 3904.4) (NFPA 1: 38.6.1.5.6.1)*
4. *All "requirements at installation" as outlined in this document, have been met.*

Manufacturer (OEM):	**C1D1 Labs, LLC** **4460 Redwood Hwy, San Rafael, CA 94903** http://c1d1labs.org c1d1labsllc@gmail.com 510-421-9021
Model Number(s):	**EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40)**

C1D1 Labs, LLC models EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are modular laboratories designed to house Liquefied Petroleum Gas (LPG) *or* Class IB flammable liquids extraction or post estraction equipment. The EB10910, EXB10920, and EXB151426 modular laboratories are intended to be installed inside an existing structure. The Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) modular laboratories are intended to be installed outdoors or inside an existing structure. The EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are only intended for extraction operations using *approved*[2] LPG extraction

[2] LPG extraction equipment used in the processing of marijuana and/or hemp shall be listed by a Nationally Recognized Testing Laboratory (NRTL) or approved. At the time of this writing, there is no UL procedure for the listing of LPG extraction equipment and therefore all extraction equipment shall be either designed by, or reviewed by, a licensed Professional Engineer. Upon installation, the engineer of record for the extraction equipment must perform a field verification to ensure compliance with the engineering peer review of the LPG extraction equipment. (IFC 3904.4) (NFPA 1: 38.6.1.5.6.1)

equipment *or* post extraction processing using Class IB flammable liquids including, but not limited to: winterization (ethanol process); rotary evaporation (ethanol process); or decarboxylation (vacuum oven/heating under vacuum). LPG solvent extraction equipment shall not be used concurrently with any other process.

This report does not focus on standard Building Code requirements for permanent or temporary sturctures. This report is intended to analyze the modular laboratory for compliance with Codes and Standards for LPG extraction and Ethanol Post Extraction Processing facilities including:

- *Arizona Fire Code 2016 Edition (Based upon IFC 2012)*
- *California Fire Code 2016 (Based upon IFC 2015)*
- *International Fire Code (IFC) 2018*
- *New York State Uniform Fire Prevention and Building Code 2017*
- *Oregon Fire Code 2014 (Based upon IFC 2012)*
- *Washington Fire Code 2015 (WAC 51-54A, Based upon IFC 2015)*
- *NFPA 1 Fire Code 2018 Edition*
- *NFPA 58 Liquefied Petroleum Gas Code 2017*
- *NFPA 30, Flammable and Combustible Liquids Code 2015*
- *NFPA 70 National Electric Code 2014*

The EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) have been reviewed by a licensed Professional Engineer and been found to be professional grade, commercially manufactured, designed and fabricated in accordance with internationally recognized codes and standards. PSI has reviewed the documentation supplied by C1D1 Labs, LLC and has determined that the EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are safe for use so long as the following conditions are met:

1. At installation, the equipment must be successfully field verified to confirm the equipment is installed in accordance with this report. Where a third-party field verification is required by the AHJ, the inspection must be performed by the engineer of record (Pressure Safety Inspectors, LLC).

2. Only approved (3rd party engineering review) LPG extraction equipment may be used

3. Upon installation, the engineer of record for the extraction equipment must perform a field verification to ensure compliance with the engineering peer review of the LPG extraction equipment (IFC 3904.4) (NFPA 1: 38.6.1.5.6.1)

4. All “requirements at installation” as outlined in this document, have been met.

The EB10910, EXB10920, EXB151426, & Shipping Container Extraction Booths (8x20, 2x8x20, 8x40) are available in several sizes as designated below:

Model	**Width x Height x Length**
EB10910	9-ft 9-in x 9-ft x 9-ft 9-in internal
EXB10920	9-ft 9-in x 9-ft x 19-ft 9-in internal
EXB151426	15-ft 0-in x 14-ft 0-in x 25-ft 9-in internal
Shipping Container Extraction Booth	
8 x 20	7-ft 8-1/2-in x 7-ft 10-1/8-in x 19-ft 3-in internal
2 x 8 x 20	15-ft 8-1/2-in x 7-ft 10-1/8-in x 19-ft 3-in internal
8 x 40	7-ft 8-1/2-in x 7-ft 10-1/8-in x 39-ft 3-in internal

Note: *The model 2x8x20 consists of two independent chambers, each with its own independent exhaust system. The values presented above represent both of these two independent chambers.*

IFC 2018 Chapter 39 (Retroactive)

The 2018 edition of the International Fire Code adds Chapter 39, Processing and Extraction Facilities. Chapter 39 is a new chapter focused on the processing and extraction of oils and fats from various plants. This process includes extraction by use of a solvent, desolventizing the raw material, production of the miscella, distillation of the solvent from the miscella and solvent recovery. The processes used are not necessarily typical hazardous material processes, and often the systems and equipment associated with such processes are not listed. Because of the typical lack of listings, the systems and equipment need specific approvals for each installation. This chapter provides the tools to appropriately address the hazards while also meeting the unique needs of industry. This chapter has provisions for a technical report prepared by a registered design professional and requires site inspections to make sure equipment and systems are installed as designed and approved.

The extraction equipment and extraction processes utilizing hydrocarbon solvents shall be located in a room or area dedicated to extraction. (IFC 3903.3)

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, the system shall be reviewed by a registered design professional. The registered design professional 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 Section 3904.3 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. (IFC 3904.2)

IFC 2018 Chapter 39 Technical Report (Retroactive)

A technical report, reviewed and approved by the fire code official as required by Section 3904.2, is required prior to the equipment being located or installed at the facility. The report shall be prepared by a registered design professional or other professional approved by the fire code official. (IFC 3904.3)
The technical report shall contain all of the following: (IFC 3904.3.1)

1. Manufacturer information.
2. Preparer of record of the technical report.
3. Date of review and report revision history.
4. Signature page, including all of the following:
    4.1. Author of the report.
    4.2. Date of report.
    4.3. Date and signature of registered design professional of record performing the design or peer review.
5. Model number of the item evaluated. If the equipment is provided with a serial number, the serial number shall be included for verification at the time of site inspection.

6. 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 whether specific codes or standards are applicable.
7. Equipment description. A list of every component and subassembly, such as fittings, hose, quick disconnects, gauges, site glass, gaskets, valves, pumps, vessels, containers and switches, of the system or equipment, indicating the manufacturer, model number, material and solvent compatibility. Manufacturer's data sheets shall be provided.
8. A general flow schematic or general process flow diagram of the process. Post-processing or winterization shall be included in this diagram. 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 P&ID) shall be provided.
9. Analysis of the vessel(s) if pressurized beyond standard atmospheric pressure. Analysis shall include purchased and fabricated components.
10. Structural analysis for the frame system supporting the equipment.
11. Process safety analysis of the extraction system, from the introduction of raw product to the end of the extraction process.
12. 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.
13. Review of the assembly instructions, operational and maintenance manuals provided by the manufacturer.
14. List of references used in the analysis.

IFC 2018 Chapter 39 Site Inspection (Retroactive)

Prior to operation of the extraction equipment, where required by the fire code official, the engineer of record or approved professional, as approved in Section 3904.2, shall inspect the site of the extraction process once equipment has been installed for compliance with the technical report and the building analysis. The 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 that the equipment installed is the same model and type of equipment identified in the technical report. (IFC 3904.4)

NFPA 1, 2018, Marijuana Processing Equipment

The 2018 edition of NFPA 1 adds Chapter 38, Marijuana Growing, Processing, or Extraction Facilities.

Systems or equipment used for the extraction of marijuana/cannabis oils and products from plant material shall be performed using equipment that has been listed or approved. (NFPA 1: 38.6.1.5.1.4)

Where the system used for extraction of marijuana oils and products from plant material is not listed, the system shall have a designer of record. (NFPA 1: 38.6.1.5.3.1)

The designer of record shall be a registered design professional. (NFPA 1: 38.6.1.5.3.2)

For systems and equipment not listed for the specific use, a technical report in accordance with Section 1.15 documenting the design or peer review of the equipment shall be prepared and submitted to the AHJ for review and approval. (NFPA 1: 38.6.1.5.4)

Where the medium of extraction or solvent is changed from the material indicated in the technical report or as required by the manufacturer, the technical report shall be revised at the cost of the facility owner and submitted for review and approval by the AHJ prior to the use of the equipment with the new medium or solvent. (NFPA 1: 38.6.1.5.5.1)

NFPA 1, 2018, Field Verification

Prior to operation of the extraction equipment, the designer of record for the equipment shall inspect the site of the extraction process once equipment has been installed for compliance with the technical report and the building analysis. (NFPA 1: 38.6.1.5.6.1)

The designer of record performing the field verification shall provide a report of findings and observations of the site inspection to the AHJ for review and approval prior to the approval of the extraction process. (NFPA 1: 38.6.1.5.6.2)

The field inspection report authored by designer 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. (NFPA 1: 38.6.1.5.6.3)

Electrical and Control System Analysis

Electrical components are summarized in the Component Compliance Matrix.

All motor controls, switches, light lamps or tubes, including connections to equipment, to be selected, furnished, and installed by end-user.

> ***Note:*** *The electrical and control system has not been evaluated by a licensed electrical Professional Engineer.*

Structural Analysis

All anchor bolts to be selected, furnished, and installed by end-user.

Note: *Certain AHJ may require additional structural analysis and or additional restraints, such as seismic. This report does not include analysis by a licensed structural Professional Engineer.*

LPG Extraction

LPG Extraction Summary

A combination of propane, n-butane and/or iso-butane may be used as the solvent in the extraction process. These solvents are all highly flammable liquefied gases that can be classified as hazardous material, compressed gas, flammable gas, and liquefied petroleum gas. This combination of gases will be referred to as LP-Gas for the remainder of this document.

LP-Gas shall be stored, used, and handled in accordance with all local building and fire code amendments, NFPA 58, the International Fire Code (IFC); Arizona Fire Code (AFC); California Fire Code (CFC); New York State Fire Code (NYUC); Oregon Fire Code (OFC); Washington Fire Code (WFC) as applicable. The LP-Gas used in the extraction process will be a food-grade type which are both colorless and odorless. In addition, LP-Gas is heavier than air.

LPG Process Description

The basic process description of a typical LP-Gas extractor is as follows:

1. Plant material is loaded into the Material Column
2. Liquid LP-Gas (Solvent) is introduced to the Material Column and allowed to soak for a period of time
3. During the soaking process the Solvent strips away the desired product from the plant material
4. The slurry, a mixture of LP-Gas and cannabinoid oils, is then transferred to a Collection Chamber
5. The LPG in the Collection Chamber is then evaporated (with heat and/or the assistance of a pump) leaving the desired product in the Collection Chamber
6. The evaporated LPG is recovered into the Recovery Tank
7. The Collection Chamber is then depressurized and opened to remove the product

LPG Extraction Modular Laboratory General Requirements

The extraction process shall be performed within a dedicated room that is fully enclosed (the modular laboratory). There must be no other equipment within the modular laboratory (i.e., refrigerators, cooking appliances, electrical panels, computers, cell phones, etc.) that is not associated with the extraction process except for an approved eye wash station. Smoking, open flames, direct fired heating devices, etc., shall be prohibited from the modular laboratory.

Openings and penetrations into the modular laboratory shall only be provided for egress, mechanical, electrical, or plumbing systems serving the modular laboratory. Penetrations shall be sealed vapor tight. Non-operable glazing (i.e., windows) is permitted where glazing does not interfere with required exhaust systems.

Exit doors from the extraction room shall swing in the direction of egress, be self-closing, and equipped with panic hardware where hazardous materials are used in the extraction process, in accordance with good practices found in NFPA 101. The means of egress shall not be obstructed (i.e., exit doors and pathways should never be blocked).

Requirements Met	Requirements At Installation
• The doors to the LP-Gas modular laboratory shall swing in the direction of egress, be self-closing, and equipped with panic hardware. • Penetrations that are not essential for the extraction process shall not penetrate the modular laboratory. • Modular laboratory construction shall be continuous, noncombustible, and smooth construction. Acoustical ceiling tiles are not permitted in the modular laboratory.	• The path of egress travel to exits and within exits shall be marked by readily visible exit signs to clearly indicate the direction of egress travel in cases where the exit or the path of egress travel is not immediately visible to the occupants. • Force required to open egress doors is not to exceed allowable limits as required by NFPA 101 Section 7.2.1.4. • An approved eyewash station shall be installed in the LP-Gas modular laboratory. • Penetrations into the LP-Gas modular laboratory shall be sealed vapor tight.

LPG Extraction Modular Laboratory Signage Requirements

The NFPA 704 Hazard Rating diamond sign shall be posted on the exterior of the modular laboratory door (see Figure 1 and Figure 2). Refer to your Safety Data Sheet for the exact hazard rating. When using a single placard, use the highest numeric rating for each of the four segments based on all chemicals being addressed. That is, if the facility has butane and propane, place a “2” in the health segment when using a single placard.

Figure 1: Sample NFPA 704 Placard - Butane

Figure 2: Sample NFPA 704 Placard - Propane

No smoking signs shall be posted at the entrance of the solvent-based modular laboratory. Additional signage maybe required by the AHJ.

Requirements Met	Requirements At Installation
	• All applicable Safety Data Sheets (SDS) shall be posted in the LP-Gas modular laboratory. • The appropriate NFPA 704 Hazard Rating diamond sign shall be posted on the exterior of the building and the door to the modular laboratory. • No smoking signs shall be posted on the exterior of the building and the door to the modular laboratory. • Applicable hazard warning signage shall be posted throughout the facility as applicable for emergency equipment (e.g. emergency eyewash, fire extinguisher, hydrocarbon monitor warning alarms, etc.). • Signage indicating "NON-ODORIZED LIQUEFIED PETROLEUM GAS" are provided on all containers using non-odorized LPG

LPG Storage and Handling Requirements

LP-Gas containers, cylinders and tanks, whether full or partially full, shall not be exposed to artificially created high temperatures exceeding 125°F (52°C) or sub-ambient (low) temperatures unless designed for use under the exposed conditions. LP-Gas shall be stored, used, and handled in accordance with the Safety Data Sheets (SDS) which are required to be posted in the control area. Portable LP-Gas containers shall be marked in accordance with CGA C-7 and shall be stored upright. Areas used for storage, use, and handling of LP-Gas containers shall be secured against unauthorized access and physical damage. LP-Gas containers shall be separated from hazardous conditions including combustible materials, extreme temperatures, falling objects, and sources of ignition (e.g., open flames, hot plates, and electrical components).

LPG containers not in use shall not be stored within extraction rooms. [2018 NFPA 1, 38.6.2.6]

Transfer of gases between containers, cylinders and tanks shall be performed by qualified personnel using equipment and operating procedures in accordance with CGA P-1.

Requirements Met	Requirements At Installation
	• Storage of flammable liquids is prohibited within the designated LP-Gas modular laboratory. • LPG containers not in use shall not be stored within the modular laboratory.

LPG Extraction Modular Laboratory Electrical Requirements

During the extraction process, the extraction equipment is a normally closed system and does not release LP-Gas. After the extraction process has completed, the spent plant material and product must be removed from the equipment. The opening of the material column and the separation vessel to remove waste or product will release LP-Gas in potentially explosive concentrations.

The National Electrical Code (NEC) defines hazardous areas as the following:

> *Articles 500 through 504 cover the requirements for electrical and electronic equipment wiring for all voltages in Class I Divisions 1 and 2; Class II, Divisions 1 and 2; and Class III, Divisions 1 and 2 locations where fire or explosion hazards may exist due to flammable gases, flammable liquid-produced vapors, combustible liquid-produced vapors, combustible dusts, or ignitable fibers/flyings.*

LP Gas is classified as a Class I, Group D flammable gas by the NFPA 58. Furthermore, NFPA 58 classifies areas (i.e., Class I locations) where flammable mixtures can be present, and NFPA 70 establishes what equipment can be used in those areas. NFPA 58 section 6.22 covers electrical ignition source control and establishes Class I criteria for hazardous areas.

Area Classification

Area classification methods provide a succinct description of the hazardous material that may be present, and the probability that it is present, so that the appropriate equipment may be selected and safe installation practices may be followed. It is intended that each room, section, or area of a facility shall be considered individually in determining its classification. The hazardous location areas take into account

the different dangers presented by potentially explosive atmospheres. This enables protective measures to be taken which account for both cost and safety factors.

Class Definition

The NEC defines three categories of hazardous materials that have been designated as Class I, Class II, or Class III. The Classes define the type of explosive or ignitable substances which are present in the atmosphere. Class I locations are those in which flammable vapors and gases may be present.

Division Definition

Each of the three Classes, discussed earlier, is further subdivided into two Divisions, Division 1 or Division 2. The Division defines the likelihood of the hazardous material being present in a flammable concentration.

Division	Definitions (Per NEC)
Division 1	In which ignitable concentrations of hazards exists under normal operation conditions and/or where hazard is caused by frequent maintenance or repair work or frequent equipment failure.
Division 2	In which ignitable concentrations of hazards are handled, processed or used, but which are normally in closed containers or closed systems from which they can only escape through accidental rupture or breakdown of such containers or systems.

The normal activity of opening the Material Column and the Collection Chamber for removal of the product will result in the release of flammable gas vapors. Therefore, this operation shall be performed in a Class I Division 1 environment. This operation could be accomplished in an appropriate fume hood enclosure (fully enclosed) or the modular laboratory itself.

The extraction equipment shall be operated in at least a Class I Division 2 environment. Since the material column and the separation vessel are opened in the same room, then the modular laboratory must meet the requirements of a Class I Division 1 location.

The electrical components within the modular laboratory shall be installed and maintained in accordance with NFPA 70.

LP-Gas extraction room lighting, if installed, shall be provided with an automatic emergency power system. [2018 NFPA 1, 38.6.2.3.5]

Requirements Met	Requirements At Installation
• All electrical components shall be properly installed in accordance with NFPA 70. • All electrical components in the LP-Gas modular laboratory shall be rated for a Class I Division 1 location.	• A Class I Division 2 boundary shall be determined by the facility engineer of record. • All metal objects including ductwork, hand sinks, water piping, etc. shall be grounded / bonded in accordance with the NFPA 70. The extraction equipment is required to be grounded/bonded. • LP-Gas modular laboratory lighting, if installed, shall be provided with an automatic emergency power system. (Where NFPA 1 is enforced)

LPG Modular Laboratory Gas Monitor Requirements

A local, permanently mounted LP-Gas detector and alarm shall be in operation at all times during the extraction process in accordance with IFC/AFC/CFC/NYUC/OFC/WFC and good engineering practice.

In addition, a portable (hand held) LP-Gas detector shall be available during extraction operations. The portable detector is used to verify leak tightness of the extraction equipment, locate suspected leaks in the system, and verify that product and waste materials are sufficiently off-gassed to allow materials to leave the Class I Division 1 environment.

Gas detection system shall be provided with constant non-interlocked power. [2018 NFPA 1, 38.6.2.3.5, 38.6.2.4.3] An automatic emergency power system shall be provided for the LP-Gas modular laboratory Gas detection system. [2018 NFPA 1, 38.6.2.3.5]

Requirements Met	Requirements At Installation
• An appropriate alarming fixed LP-Gas monitoring device rated for a Class I Division 1 environment shall be installed in the LP-Gas modular laboratory. The fixed LP-Gas monitoring device must be ON whenever LP-Gas is present in the solvent modular laboratory. • The fixed LP-Gas monitoring system shall be installed in accordance with the manufacturer's instructions in a position	• An appropriate portable LP-Gas monitoring device rated for a Class I Division 1 environment shall be provided for the operators. • Gas detection system shall be provided with constant non-interlocked power. (Where NFPA 1 is enforced) • An automatic emergency power system shall be provided for the LP-Gas modular

Requirements Met	Requirements At Installation
suitable for detecting leaking solvents prior to gas concentration reaching the LFL/LEL.	laboratory Gas detection system. (Where NFPA 1 is enforced)

LPG Modular Laboratory Suppression Requirements

Automatic Fire suppression (sprinklers), automatic fire detection and alarm systems shall be required throughout the building and booths if building is larger than 12,000 square feet or local laws require extraction areas to have automatic suppression. At a minimum, Automatic Fire suppression shall be installed in the modular laboratory.

At least one (1) 4-A:40-B:C fire extinguishers shall be located within 30 feet of the extraction area in accordance with IFC/AFC/CFC/NYUC/OFC/WFC Tables 906.3 (1) and (2) and good engineering practice.

Requirements Met	Requirements At Installation
	• Automatic fire suppression shall be installed within the modular laboratory. • At least one (1) 4-A:40-B:C fire extinguisher shall be located within 30 feet of the extraction area in accordance with IFC/AFC/CFC/NYUC/OFC/WFC Tables 906.3 (1) and (2).

Recommendation:

- A second 4-A:40-B:C fire extinguisher is recommended to be placed within 30-feet of the extraction area.

LPG Modular Laboratory Hazardous Exhaust System Requirements

International Mechanical Code

Note: *This section highlights some of the code requirements in IMC Section 510. All requirements in IMC Section 510 shall be incorporated by the facility engineer of record.*

A hazardous exhaust system is required within the LP-Gas modular laboratory. The system must continuously operate when LP-Gas is used or stored in the modular laboratory. The exhaust system shall be installed in accordance with the International Mechanical Code.

LP-Gases are heavier than air, therefore, the exhaust vent shall be located within 12 inches of the floor. The location of the exhaust and make-up air openings shall be located to provide air movement across all portions of the modular laboratory.

Exhaust air shall not be recirculated to occupied areas (i.e., must vent directly outdoors). Exhausted air shall be expelled at least 10 feet from operable exterior windows and doors. Fresh ventilation air shall be separated by at least 10 feet from outdoor gas storage areas.

An acceptable hazardous exhaust system must ensure the appropriate capture velocity has been achieved at the hazard source in accordance with the IMC Section 510.5 and IFC/AFC/CFC/NYUC/OFC/WFC 5004.3.1.2. Determining the appropriate capture velocity is process specific and depends heavily on how the operator uses the equipment. Per IMC 510.5.4, the contaminants that are captured must be diluted below the thresholds in IMC 510.2, or 25% of the LFL of the solvent.

California Mechanical Code

Note: *This section highlights some of the code requirements in CMC Chapter 5. All requirements in CMC Chapter 5 shall be incorporated by the facility engineer of record.*

A hazardous exhaust system is required within the LP-Gas modular laboratory. The system must continuously operate when LP-Gas is used or stored in the modular laboratory. The exhaust system shall be installed in accordance with the California Mechanical Code.

LP-Gases are heavier than air, therefore, the exhaust vent shall be located within 12 inches of the floor. The location of the exhaust and make-up air openings shall be located to provide air movement across all portions of the modular laboratory.

Exhaust air shall not be recirculated to occupied areas (i.e., must vent directly outdoors). Ducts conveying explosive or flammable vapors, fumes, or dusts shall terminate not less than 30 feet from a property line, 10 feet from openings into the building, 6 feet from exterior walls or roofs, 30 feet from combustible walls or openings into the building that are in the direction of the exhaust discharge, and 10 feet above adjoining grade (CMC 502.2.2).

Parts of fans in contact with explosive or flammable vapors, fumes, or dusts shall be of nonferrous or nonsparking materials or their casing shall be lined or constructed of such material. Where the size and hardness of materials passing through a fan are capable of producing a spark, both the fan and the casing shall be of nonsparking materials. Where fans are required to be spark-resistant, their bearings shall not be within the airstream, and parts of the fan shall be grounded. Fans in systems handling materials that are likely to clog the blades, and fans in buffing or woodworking exhaust systems, shall be of the radial-blade or tube-axial type. Equipment used to exhaust explosive or flammable vapors, fumes, or dusts shall bear an identification plate stating the ventilation rate for which the system was designed (CMC 503.2).

An acceptable hazardous exhaust system must ensure the appropriate capture velocity has been achieved at the hazard source in accordance with the CMC Chapter 5. Determining the appropriate capture velocity is process specific and depends heavily on how the operator uses the equipment. Per CMC, the contaminants that are captured must be diluted below 25% of the LFL of the solvent.

Solvent	LFL (% of air by volume / ppm)	25% LFL (ppm)
n-Butane	1.86% / 18,600 ppm	4,650
Iso-Butane	1.80% / 18,000 ppm	4,500
Propane	2.1% / 21,000 ppm	5,250

Note: When blended gas is used, the mechanical engineer shall determine the LFL.

Due to a number of variables involved with the process, it is impossible to predict a credible off-gas rate. Therefore, an appropriate approach is to oversize the exhaust system to ensure capture velocity is met in a worst-case scenario. In addition, a negative pressure relative to surrounding areas must be maintained so that flammable vapors do not migrate beyond the modular laboratory.

C1D1 Labs, LLC has installed a variable speed exhaust fan. The exhaust fan operates at low speed whenever LP-Gas is used or stored in the LPG modular laboratory. The exhaust fan is speed is increased when flammable gas concentrates in excess of 10% LEL are detected.

For models EB10910, EXB10920, and all Shipping Container Extraction Booths, the low speed exhaust provides 500 CFM and the high-speed exhaust provides 1,500 CFM. For model EXB151426, the low speed exhaust provides 650 CFM and the high-speed exhaust provides 2,000 CFM.

> ***Note:*** *The model 2x8x20 consists of two independent chambers, each with its own independent exhaust system. The values presented below represent one of these two independent systems.*

Model	Fan Flow – Low	Fan Flow – High
EB10910	500 CFM	1,500 CFM
EXB10920	500 CFM	1,500 CFM
EXB151426	650 CFM	2,000 CFM
Shipping Container Extraction Booths	500 CFM	1,500 CFM

All electrical components within the LP-Gas extraction room shall be interlocked such that the exhaust system shall be in operation for lighting and components to be used. [2018 NFPA 1, 38.6.2.3.4, 38.6.3.2.4]

An automatic emergency power system shall be provided for the LP-Gas extraction room ventilation system. [2018 NFPA 1, 38.6.2.3.5]

Requirements Met	Requirements At Installation
• The mechanical (HVAC) engineer shall verify that the appropriate capture velocity has been achieved at the hazard source in accordance with the CMC Chapter 5 or IMC Section 510.5. • The exhaust fan shall be listed for hazardous exhaust duty and must be of aluminum construction, spark resistant, and the motor shall not be located within the airstream. • The exhaust fan shall be listed for hazardous exhaust duty and must comply with CMC 503.2. • Hazardous exhaust registers/vents must be located within 12 inches of the floor within the modular laboratory. • The location of the exhaust and inlet air openings shall be located to provide air movement across all portions of the modular laboratory. There must be airflow across any area where there is a potential for the presence of LP-Gas.	• The exhaust fans must be relocated to the end of the duct run (indoors) and the interconnecting ductwork must be installed in compliance with CMC or IMC. • Capture velocity shall be verified at installation. (best industry practice is approximately 100 linear feet per minute) • Hazardous exhaust ductwork 10-inch diameter or greater shall be equipped with fire suppression as required by IMC or CMC. Site specific requirements shall be determined by the facility engineer of record. • The expelled exhaust air outlet shall be separated from operable doors, windows, LP Gas storage, and ventilation air inlets by a minimum of 10 feet. • All electrical components within the LP-Gas extraction room shall be interlocked such that the exhaust system shall be in operation for lighting and components to be used. (Where NFPA 1 is enforced) • An automatic emergency power system shall be provided for the LP-Gas modular laboratory ventilation system. (Where NFPA 1 is enforced)

Ethanol Post Extraction Processing

Ethanol Post Extraction Processing

Ethanol, also known as ethyl alcohol or drinking alcohol (C_2H_6O), is defined as a Class IB Flammable Liquid by NFPA 30, *Flammable and Combustible Liquids Code*. This classification indicates that ethanol has a low flash point temperature and represents a significant fire hazard in the liquid state. Ethanol vapors are heavier than air.

Ethanol Post Extraction Process Description

In general, ethanol may be used to further refine the extracted product using a number of different methods including but not limited to: winterization, distillation, and/or leaching.

Ethanol Post Extraction Processing Modular Laboratory General Requirements

The post extraction process shall be performed within a room that is fully enclosed (the modular laboratory). Smoking, open flames, direct fired heating devices, etc., shall be prohibited from the post extraction processing modular laboratory. The post extraction processing may occur in a hood.

Exit doors from the post-extraction modular laboratory shall swing in the direction of egress, be self-closing, and equipped with panic hardware where hazardous materials are used in the post-extraction process, in accordance with good practices found in NFPA 101. The means of egress shall not be obstructed (i.e., exit doors and pathways should never be blocked).

Requirements Met	Requirements At Installation
• The doors to the post extraction processing modular laboratory shall swing in the direction of egress, be self-closing, and equipped with panic hardware.	• The path of egress travel to exits and within exits shall be marked by readily visible (illuminated) exit signs to clearly indicate the direction of egress travel in cases where the exit or the path of egress travel is not immediately visible to the occupants. • Force required to open egress doors is not to exceed allowable limits as required by NFPA 101 Section 7.2.1.4.

Requirements Met	Requirements At Installation
	• An approved eyewash station shall be installed in the post extraction processing modular laboratory.

Ethanol Post Extraction Processing Modular Laboratory Signage Requirements

The NFPA 704 Hazard Rating diamond sign shall be posted on the exterior of the post extraction processing modular laboratory door and on the main entrance of the facility (see Figure 3).

Diamond	Hazard	Value	Description
	Health	2	Can cause temporary incapacitation or residual injury.
	Flammability	3	Can be ignited under almost all ambient temperature conditions.
	Instability	0	Normally stable, even under fire conditions.
	Special		

Figure 3: NFPA 704 Example: Ethanol (See SDS for exact hazard rating)

No smoking signs shall be posted at the entrance of the post extraction modular laboratory. Additional signage maybe required by the AHJ.

Requirements Met	Requirements At Installation
	• All applicable Safety Data Sheets (SDS) shall be posted in the Ethanol post extraction processing modular laboratory. • The appropriate NFPA 704 Hazard Rating diamond sign shall be posted on the exterior of the building and the door to the modular laboratory. • No smoking signs shall be posted on the exterior of the building and the door to the modular laboratory. • Applicable hazard warning signage shall be posted throughout the facility as applicable for emergency equipment (e.g. emergency eyewash, fire extinguisher, hydrocarbon monitor warning alarms, etc.).

Ethanol Post Extraction Processing Electrical Requirements

The post extraction processing equipment may release ethanol vapors to the operational environment. Therefore, explosive concentrations of ethanol vapor may regularly exist within the modular laboratory during the post extraction process. Due to the potential presence of flammable vapors, the post extraction processing modular laboratory is classified as a Class I, Division 2 hazardous area unless adequate ventilation is provided as determined by the engineer of record.

Alcohol (ethanol) is defined as a Class IB Flammable Liquid by NFPA 30, *Flammable and Combustible Liquids Code*. This classification indicates that ethanol has a low flash point temperature and represents a significant fire hazard in the liquid state. Ethanol in the vapor phase, even in small quantities, can develop into a much more serious condition.

The post extraction process shall be performed within the post extraction processing modular laboratory, which shall meet NEC Class I Division 2 electrical requirements unless adequate ventilation is provided as determined by the engineer of record.

Requirements Met	Requirements At Installation
• All electrical components shall be properly installed in accordance with NFPA 70. • All electrical components in the Ethanol post extraction processing modular laboratory shall be rated for a Class I Division 2 location unless adequate ventilation is provided as determined by the engineer of record.	• All metal objects including ductwork, hand sinks, water piping, etc. shall be grounded / bonded in accordance with the NFPA 70. The post extraction processing equipment is required to be grounded/bonded.

Ethanol Post Extraction Processing Modular Laboratory Gas Monitor Requirements

A local continuous-reading flammable gas detector and alarm is not required for the fume hood nor for the Ethanol Post Extraction Processing modular laboratory, in accordance with IFC/AFC/CFC/NYUC/OFC/WFC or NFPA 1 and NPFA 30. C1D1 Labs, LLC has installed a gas detector to interlock the hazardous exhaust system.

The instrument shall be appropriately calibrated for the appropriate solvent (i.e., ethanol) and set to alarm at 25% of the LFL/LEL. Any detector rated for a Class I Division 2 environment may be used**.**

Requirements Met	Requirements At Installation
• An appropriate alarming fixed flammable vapor monitoring device rated for a Class I Division 2 environment shall be installed in the Post-Extraction Processing modular laboratory. The fixed flammable vapor monitoring device must be ON whenever ethanol is present in the post-extraction processing modular laboratory. • The fixed flammable vapor monitoring system shall be installed in accordance with the manufacturer's instructions in a position suitable for detecting leaking solvents prior to gas concentration reaching the LFL/LEL.	• A certificate of calibration from the manufacturer showing that the flammable vapor detection system instrument is properly calibrated to alarm when vapor concentrations of ethanol exceed 25% of the LFL/LEL shall be provided.

Ethanol Post Extraction Processing Modular Laboratory Suppression System Requirements

Automatic fire suppression is required within either the fume hood or the entire post extraction processing modular laboratory depending on where the distillation process is performed.

At least one (1) 4-A:40-B:C fire extinguishers shall be located within 30 feet of the extraction area in accordance with IFC/AFC/CFC/NYUC/OFC/WFC Tables 906.3 (1) and (2).

Requirements Met	Requirements At Installation
	• Automatic fire suppression shall be installed within the modular laboratory. • At least one (1) 4-A:40-B:C fire extinguishers shall be located within 30 feet of the extraction area in accordance with IFC/AFC/CFC/NYUC/OFC/WFC Tables 906.3 (1) and (2).

Recommendation:

- A second 4-A:40-B:C fire extinguisher is recommended to be placed within 30-feet of the extraction area.

Ethanol Post Extraction Processing Modular Laboratory Hazardous Exhaust System Requirements

International Mechanical Code

Note: *This section highlights some of the code requirements in IMC Section 510. All requirements in IMC Section 510 shall be incorporated by the facility engineer of record.*

A hazardous exhaust system is required within the Ethanol post extraction processing modular laboratory. The system must continuously operate when Ethanol is used or stored in the modular laboratory. The exhaust system shall be installed in accordance with the International Mechanical Code.

Ethanol vapors are heavier than air and therefore the exhaust vent shall be located within 12 inches of the floor. The location of the exhaust and inlet air openings shall be located to provide air movement across all portions of the modular laboratory.

Exhaust air shall not be recirculated to occupied areas (i.e., must vent directly outdoors). Exhausted air shall be expelled at least 10 feet from operable exterior windows and doors. Fresh ventilation air shall be separated by at least 10 feet from outdoor gas storage areas.

An acceptable hazardous exhaust system must ensure the appropriate capture velocity has been achieved at the hazard source in accordance with the IMC Section 510.5 and IFC/AFC/CFC/NYUC/OFC/WFC 5004.3.1.2. Determining the appropriate capture velocity is process specific and depends heavily on how the operator uses the equipment. Per IMC 510.5.4, the contaminants that are captured must be diluted below the thresholds in IMC 510.2, or 25% of the LFL of the solvent.

California Mechanical Code

Note: *This section highlights some of the code requirements in CMC Chapter 5. All requirements in CMC Chapter 5 shall be incorporated by the facility engineer of record.*

A hazardous exhaust system is required within the Ethanol post extraction processing modular laboratory. The system must continuously operate when Ethanol is used or stored in the post extraction processing modular laboratory. The exhaust system shall be installed in accordance with the California Mechanical Code.

Ethanol vapors are heavier than air and therefore the exhaust vent shall be located within 6 inches of the floor. The location of the exhaust and inlet air openings shall be located to provide air movement across all portions of the modular laboratory.

Exhaust air shall not be recirculated to occupied areas (i.e., must vent directly outdoors). Ducts conveying explosive or flammable vapors, fumes, or dusts shall terminate not less than 30 feet from a property line,

10 feet from openings into the building, 6 feet from exterior walls or roofs, 30 feet from combustible walls or openings into the building that are in the direction of the exhaust discharge, and 10 feet above adjoining grade (CMC 502.2.2).

Parts of fans in contact with explosive or flammable vapors, fumes, or dusts shall be of nonferrous or nonsparking materials or their casing shall be lined or constructed of such material. Where the size and hardness of materials passing through a fan are capable of producing a spark, both the fan and the casing shall be of nonsparking materials. Where fans are required to be spark-resistant, their bearings shall not be within the airstream, and parts of the fan shall be grounded. Fans in systems handling materials that are likely to clog the blades, and fans in buffing or woodworking exhaust systems, shall be of the radial-blade or tube-axial type. Equipment used to exhaust explosive or flammable vapors, fumes, or dusts shall bear an identification plate stating the ventilation rate for which the system was designed (CMC 503.2).

An acceptable hazardous exhaust system must ensure the appropriate capture velocity has been achieved at the hazard source in accordance with the CMC Chapter 5. Determining the appropriate capture velocity is process specific and depends heavily on how the operator uses the equipment. Per CMC, the contaminants that are captured must be diluted below 25% of the LFL of the solvent.

Solvent	**LFL (% of air by volume / ppm)**	**25% LFL (ppm)**
Ethanol	3.3% / 33,000 ppm	8,250

Due to a number of variables involved with the process, it is impossible to predict a credible off-gas rate. Therefore, an appropriate approach is to oversize the exhaust system to ensure capture velocity is met in a worst-case scenario.

C1D1 Labs, LLC has installed a variable speed exhaust fan. The exhaust fan operates at low speed whenever ethanol is used or stored in the Post-Extraction modular laboratory. The exhaust fan is speed is increased when flammable gas concentrates in excess of 10% LEL are detected.

For models EB10910, EXB10920, and all Shipping Container Extraction Booths, the low speed exhaust provides 500 CFM and the high-speed exhaust provides 1,500 CFM. For model EXB151426, the low speed exhaust provides 650 CFM and the high-speed exhaust provides 2,000 CFM.

> ***Note:*** *The model 2x8x20 consists of two independent chambers, each with its own independent exhaust system. The values presented below represent one of these two independent systems.*

Model	**Fan Flow – Low**	**Fan Flow – High**
EB10910	500 CFM	1,500 CFM
EXB10920	500 CFM	1,500 CFM
EXB151426	650 CFM	2,000 CFM
Shipping Container Extraction Booths	500 CFM	1,500 CFM

Requirements Met	Requirements At Installation
• The mechanical (HVAC) engineer shall verify that the appropriate capture velocity has been achieved at the hazard source in accordance with the CMC Chapter 5 or IMC Section 510.5. • The exhaust fan shall be listed for hazardous exhaust duty and must be of aluminum construction, spark resistant, and the motor shall not be located within the airstream. • The exhaust fan shall be listed for hazardous exhaust duty and must comply with CMC 503.2. • Hazardous exhaust registers/vents must be located within 12 inches of the floor within the modular laboratory. • The location of the exhaust and inlet air openings shall be located to provide air movement across all portions of the modular laboratory. There must be airflow across any area where there is a potential for the presence of Ethanol.	• The exhaust fans must be relocated to the end of the duct run (indoors) and the interconnecting ductwork must be installed in compliance with CMC or IMC. • Capture velocity shall be verified at installation. (best industry practice is approximately 100 linear feet per minute) • Hazardous exhaust ductwork 10-inch diameter or greater shall be equipped with fire suppression as required by IMC or CMC. Site specific requirements shall be determined by the facility engineer of record. • The expelled exhaust air outlet shall be separated from operable doors, windows, LP Gas storage, and ventilation air inlets by a minimum of 10 feet.

LP-Gas Equipment Process Hazard Analysis

The process may use butane and/or propane to extract desired products from plant material.

Propane and Butane (also called LPG or LP-Gas) are liquefied flammable gas stored under pressure. In most LPG extraction equipment, LP-Gas is vaporized to a gas before it leaves the tank. LP-Gas is highly flammable when mixed with air (oxygen) and can be ignited by many sources, including open flames, smoking materials, electrical sparks, and static electricity. Severe "freeze burn" or frostbite can result if LP-Gas liquid comes in contact with your skin. Reference a Safety Datasheet (SDS) for more detailed information and personal protective equipment (PPE) that must be used when using LPG extraction equipment.

Hazard	Cause	Safeguards
Asphyxiation	Release of LP-Gas in the facility due to relief valves cracking	The facility shall have an appropriate hazardous exhaust system installed to ensure any LP-Gas release is exhausted from the space.
Asphyxiation	Release of LP-Gas in the facility due to a leaking seal or fitting	A local, permanently mounted LP-Gas monitor shall be in operation at all times during the extraction process or where LP-Gas is used or stored.
Asphyxiation	Release of LP-Gas in the facility due to a leaking seal or fitting	A hazardous exhaust system is required.
Asphyxiation	Release of LP-Gas in the facility due to a leaking seal or fitting	Proper signage shall be posted on the exterior door of each room/area utilizing LP-Gas and in each room storing LP-Gas. NFPA 704 Hazard Diamonds shall be posted at the exterior main entrance and at rooms where LP-Gas is used or stored.
Explosion Hazard/Fire	Release of LP-Gas in the facility due to relief valves cracking	The facility shall have an appropriate hazardous exhaust system installed to

Hazard	Cause	Safeguards
		ensure any LP-Gas release is exhausted from the space. The facility shall provide adequate ventilation/exhaust as determined by the Engineer of Record in order to maintain the local atmosphere below 25% of the Lower Flammability Limit (LFL) for this application. Ancillary equipment shall be located in another room. An alarming hydrocarbon detector shall be employed in the extraction area. Extraction room is a Class I Division 1 electrical space. Equipment not rated for the space is not permitted.
Explosion Hazard/Fire	Release of LP-Gas in the facility due to a leaking seal or fitting	The facility shall have an appropriate hazardous exhaust system installed to ensure any LP-Gas release is exhausted from the space. The facility shall provide adequate ventilation/exhaust as determined by the Engineer of Record in order to maintain the local atmosphere below 25% of the Lower Flammability Limit (LFL) for this application. Ancillary equipment should be located in another room. An alarming hydrocarbon detector shall be employed in the extraction area. Extraction room is a Class I Division 1 electrical space. Equipment not rated for the space is not permitted.

Hazard	Cause	Safeguards
Contact with skin or eyes	Release of LP-Gas in the facility due to a leaking seal or fitting	Appropriate PPE shall be worn at all times. Refer to Propane and/or Butane MSDS for detailed information.
Contact with eyes	Release of LP-Gas in the facility due to a leaking seal or fitting	Eyewash station is provided.

Ethanol Process Hazard Analysis

This process may use ethanol to extract desired products from plant material.

Ethanol is highly flammable when mixed with air (oxygen) and can be ignited by many sources, including open flames, smoking materials, electrical sparks, and static electricity. Reference a Safety Datasheet (SDS) (formerly MSDS) for more detailed information and personal protective equipment (PPE) that must be used when using this equipment.

Hazard	Cause	Safeguards
Explosion Hazard/Fire	Release of Ethanol (Vapor) in the facility	The facility must have an appropriate hazardous exhaust system installed to ensure any Ethanol vapor release is exhausted from the space. The facility must provide adequate ventilation/exhaust as determined by the Engineer of Record in order to maintain the local atmosphere below 25% of the Lower Flammability Limit (LFL) for this application. Ancillary equipment should be located in another room.
Explosion Hazard/Fire	Release of Ethanol (Liquid) in the facility due to a leaking seal or fitting	The facility must have an appropriate hazardous exhaust system installed to ensure any Ethanol vapor release is exhausted from the space. The facility must provide adequate ventilation/exhaust as determined by the Engineer of Record in order to maintain the local atmosphere below 25% of the Lower Flammability Limit (LFL) for this application.

Hazard	Cause	Safeguards
		Ancillary equipment should be located in another room. Spills: Stop leak if you can do it without risk. Contact your local fire department. Eliminate all sources of ignition and static; restrict access to area until completion of clean-up procedure. Wear adequate protective equipment, use self-contained breathing apparatus in confined poorly-ventilated areas. Large quantities should be absorbed on to sand, vermiculite or an equivalent absorbent material and removed to a safe area for disposal. Flush the contaminated area with plenty of water. Incineration is the recommended method of disposal.
Contact with skin or eyes	Release of Ethanol in the facility due to a leaking seal or fitting	Appropriate PPE should be worn at all times. Refer to Ethanol Safety Data Sheet (SDS) for detailed information.
Contact with eyes	Release of LP-Gas in the facility due to a leaking seal or fitting	Eyewash station is provided.

Component Compliance Matrix

C1D1 Labs, LLC

Item Number	Component ID Number (Vendor Part Number)	Description	Vendor	Referenced Code	Notes	Finding/ Observation
1	HA18	Exhaust Fan, 1HP, XP Motor, 1500 CFM	ACME Engineering	AMCA 99-0401	Notes 1, 2, 3.	
2	AAFS Series	Airflow Switch, IP65 enclosure, 200-1800 FPM	Dwyer		The switch enclosure is not rated for a classified electrical environment	Observation
3	M2A Series	Gas Detector, LEL, CID1	RKI Instruments	UL CID1		
4	EPSN-HRN-PA	Gas Detector Audible Alarm, CID1	Larson Electronics	UL CID1		
5	EPSLED-80	Gas Detector Strobe Alarm, Amber, CID1	Larson Electronics	UL CID1		
6	EOL-EMG-EXT-3W	Illuminated Exit, CID1	Larson Electronics	UL CID1		
7	EPL-48-2L-LED	Light Fixture, CID1	Larson Electronics	UL CID1		
8	EPS-PB10	Emergency Stop Switch, CID1	Larson Electronics	UL CID1		
9	PM1M-004600UL	Control Panel, UL Listed	OPA	UL 508A		

Notes:		
1	The exhaust fan shall be listed for hazardous exhaust duty (spark resistant construction type A or B). The motor shall be listed and rated for the environment (Class I Division 1 or 2).	
2	This exhaust fan must be installed by a licensed mechanical contractor. The as-installed configuration must be tested to verify a minimum of 75 linear feet per minute airflow is achieved in high-flow mode.	
3	The exhaust fans must be relocated to the end of the duct run (indoors) and the interconnecting ductwork must be installed in compliance with CMC or IMC.	

Typical Modular Laboratory Layouts

GENERAL INFO
HYDROCARBON EXTRACTION BOOTH IS MADE OF 18 GAUGE SHEET METAL AND IS NOT FIRE-RATED. THE SHEET METAL WALLS AND CEILING ASSEMBLIES ARE CONSTRUCTED TO MEET NFPA 33, SECTION 5.3.2. THIS BOOTH IS FOR INDOOR INSTALLATION ONLY ("ROOM WITHIN STRUCTURE"). "STRUCTURE" SHALL BE CONSTRUCTED PER NFPA 58 SECTTION 10.3 REQUIREMENTS. PER NFPA 33, SECTION 5.5, THE BOOTH SHOULD BE INSTALLED AT LEAST 3 FEET FROM OTHER WORK STATIONS; THE BOOTH COULD BE ASSEMBLED WITHIN LIMITS IF A WALL, PARTITION, OR OUTER WALL AND MUST HAVE A 1 HR FIRE RESISTANCE RATING AS REQUIRED BY. BOOTHS CONNECTED TOGETHER ARE NOT CONSIDERED AS OTHER WORK AREAS.

VENTILATION
THIS BOOTH INCLUDES A SINGLE SPARK RESISTANT, EXPLOSION PROOF EXHAUST FAN AND IS PROVIDED WITH AN IDENTIFICATION PLATE THAT NOTES "BASE AIR FLOWRATE = 500 CFM" AND "PURGE AIR FLOWRATE = 1,500 CFM" PER 2016 CALIFORNIA MECHANICAL CODE SECTION 503.2 REQUIREMENTS. THE EXHAUST FAN OPERATION IS INTERLOCKED TO OPERATE AT A BASEFLOW RATE OF 500 CFM WHEN LIGHTING AND OTHER COMPONENTS ARE BEING USED PER NFPA 1.386.3.2.4. WHEN 10%LEL IS DETECTED THROUGH THE HYDROCARBON MONITORING SYSTEM, THE EXHAUST FAN RAMPS UP TO THE PURGE FLOWRATE OF 1,500 CFM UNTIL MONITORING LEVEL RETURNS TO 0%.

THE EXHAUST FAN SPEED IS CONTROLLED BY A VARIABLE FREQUENCY DRIVE (VFD). THE PROVIDED VFD IS PROGRAMMED TO OPERATE AT 30 HZ FOR THE BASE AIR FLOWRATE OF 500 CFM AND 60 HZ FOR THE PURGE AIR FLOWRATE OF 1,500 CFM. OWNER MAY BE REQUIRED TO BALANCE SYSTEM IN FIELD BASED ON CONNECTED DUCTING SYSTEMS.

ALL DUCTWORK PROVIDED WITH THE BOOTH IS GALVANIZED STEEL PER NFPA 33.7.8.

HYDROCARBON MONITORING SYSTEM
THE BOOTH IS PROVIDED WITH AN EXPLOSION PROOF GENERAL PURPOSE MONITOR THAT MONITIORS HYDROCARBON LOWER EXPLOSIVE LIMIT (LEL). WHEN 10%LEL IS DETECTED THE VISUAL ALARM AND PURGE VENTILATION IS ENABLED UNTIL MONITORING LEVEL RETURNS TO 0%. WHEN 25%LEL IS DETECTED THE AUDIBLE ALARM IS ENABLED (WHILE VISUAL ALARM AND PURGE VENTILATION REMAINS ENABLED) UNTIL MONITORING LEVEL RETURNS TO 0%. THE MONITIOR, VISUAL ALARM AND AUDIBLE ALARM ARE INSTALLED INSIDE OF THE BOOTH. THE BOOTH INCLUDES AN INTERLOCK THAT IS WIRED TO THE AUDIBLE HORN TO ALARM, DEACTIVATION OF THE HEATING SYSTEM (OWNER TO COORDINATE) AND ACTIVATE THE PURGE EXHAUST VENTILATION, UPON FAILURE OF THE GAS DETECTION SYSTEM PER 2016 CALIFORNIA FIRE CODE SECTION 3805.1.4.

ADDITIONAL NOTES
VERIFY ALL ADDITIONAL REQUIREMENTS WITH THE AUTHORITY HAVING JURISDICTION (AHJ).

ANY ELECTRICAL, PLUMBING, OR OTHER PENETRATIONS INTO BOOTH MUST BE SEALED WITH FIRE STOPPING PER NFPA 91, SECTION 4.2.13.

OWNER SHALL HIRE A PROFESSIONAL MECHANICAL ENGINEER TO DESIGN, SPECIFY AND SIZE THE ADDITIONAL MECHANICAL DUCTWORK AND SYSTEMS, AND AUTOMATIC FIRE PROTECTION SYSTEMS AS REQUIRED PER PER NFPA 1, SECTION 38.6.2.6.

THE OWNER SHALL HIRE A LICENSED MECHANICAL CONTRACTOR WITH CURRENT C-10 LICENSE ISSUED BE THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE MECHANICAL DEVICES.

THE OWNER SHALL HIRE A CONTRACTOR WITH CURRENT C-16 LICENSE ISSUED BY THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE FIRE PROTECTION SYSTEMS.

OWNER SHALL PROVIDE MAKE UP AIR AND EXHAUST DUCTING TO/FROM OUTSIDE THE BUILDING PER NFPA 33 SECTIONS 7.3, 7.4, 7.5, 7.6, 7.7, AND 7.8

OWNER SHALL PROVIDE MEANS OF DISSIPATING STATIC CHARGE ACCUMULATION PER NFPA 1, SECTION 60.5.1.10.2.

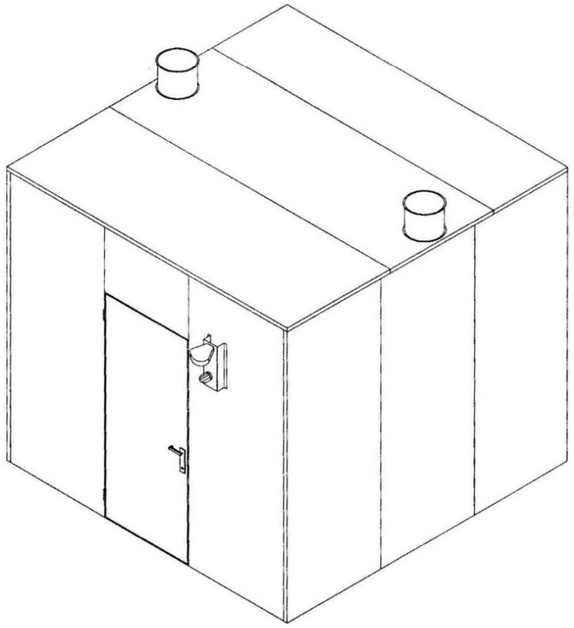
C1D1 LABS WILL PROVIDE AN AIRFLOW SWITCH THAT IS WIRED TO THE AUDIBLE HORN TO ALARM UPON FAILURE OF THE VENTILATION SYSTEM. AIR FLOW SWITCH NEEDS TO BE INSTALLED IN THE EXHAUST VENTILATION BY OWNER, PER THE MANUFACTURER'S INSTRUCTIONS.

2016 CFC, 5803.1.3: COMPRESSED GAS SYSTEMS CONVEYING FLAMMABLE GASES SHALL BE PROVIDED WITH APPROVED MANUAL OR AUTOMATIC EMERGENCY SHUTOFF VALVES THAT CAN BE ACTIVATED AT EACHPOINT OF USE AND AT EACH SOURCE

EQUIPMENT LIST

QUANTITY	ITEM	DESCRIPTION
1	CONTROL PANEL	UL-LISTED, UL508A, (2) 1 TO 3 PHASE VARIABLE SPEED DRIVES, MICRO PLC
3	CONTROL SETTINGS	OFF, FAN ON, FAN AND LIGHTS ON
1	LIGHT ALARM	AMBER, CLASS 1, DIV. 2 RATED
1	SOUND ALARM	24V DC, 109 DB AT 1M
1	LED LIGHT	CLASS 1 - DIV 1 - T6 EXPLOSION PROOF LED
1	GAS DETECTOR	RKI M2A GAS DETECTOR
1	EMERGENCY STOP	CLASS 1 DIV 1 3 POSITION SWITCH
1	EXHAUST FAN	18H1849 SPR W/ VFD RATED (2 SPEED CONTROL)
1	INTAKE FAN	18H1849 SPR W/ VFD RATED (2 SPEED CONTROL)
1	AIR FLOW SHUT OFF SWITCH	

ALARM SET POINTS
AT 10% LEL AMBER LIGHT ALARM WILL START AND PURGE AIR FLOW RATE WILL RUN AT 1500 CFM
AT 25% LEL AMBER LIGHT ALARM, PURGE AIR FLOW RATE RUNS AT 1500 CFM, AND SOUND ALARM WILL START



NOTES:
PANELS HAVE SMOOTH SURFACE FACING IN UNLESS OTHERWISE NOTED

MATERIAL:
18 GA G90 GALVANIZED STEEL

SHEET TITLE: EXTRACTION BOOTH		C1D1 LABS	C1D1 LABS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	DRAWING TITLE: EB10910	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.
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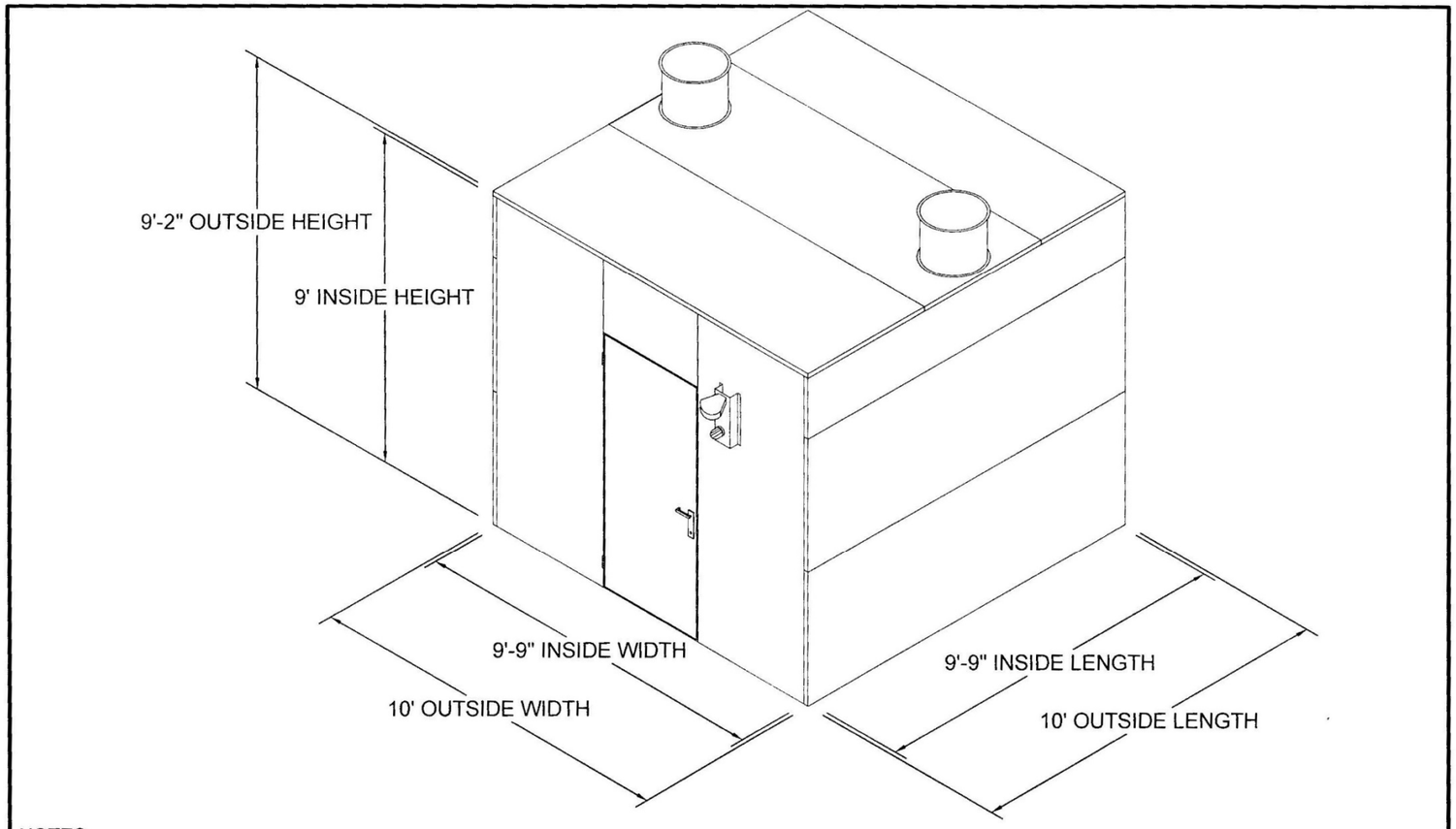

NOTES:
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FACING IN UNLESS OTHERWISE NOTED

		SHEET TITLE: FRONT RIGHT VIEW	C1D1 LABS	C1D1 LABS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	DRAWING TITLE: EB10910	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.	
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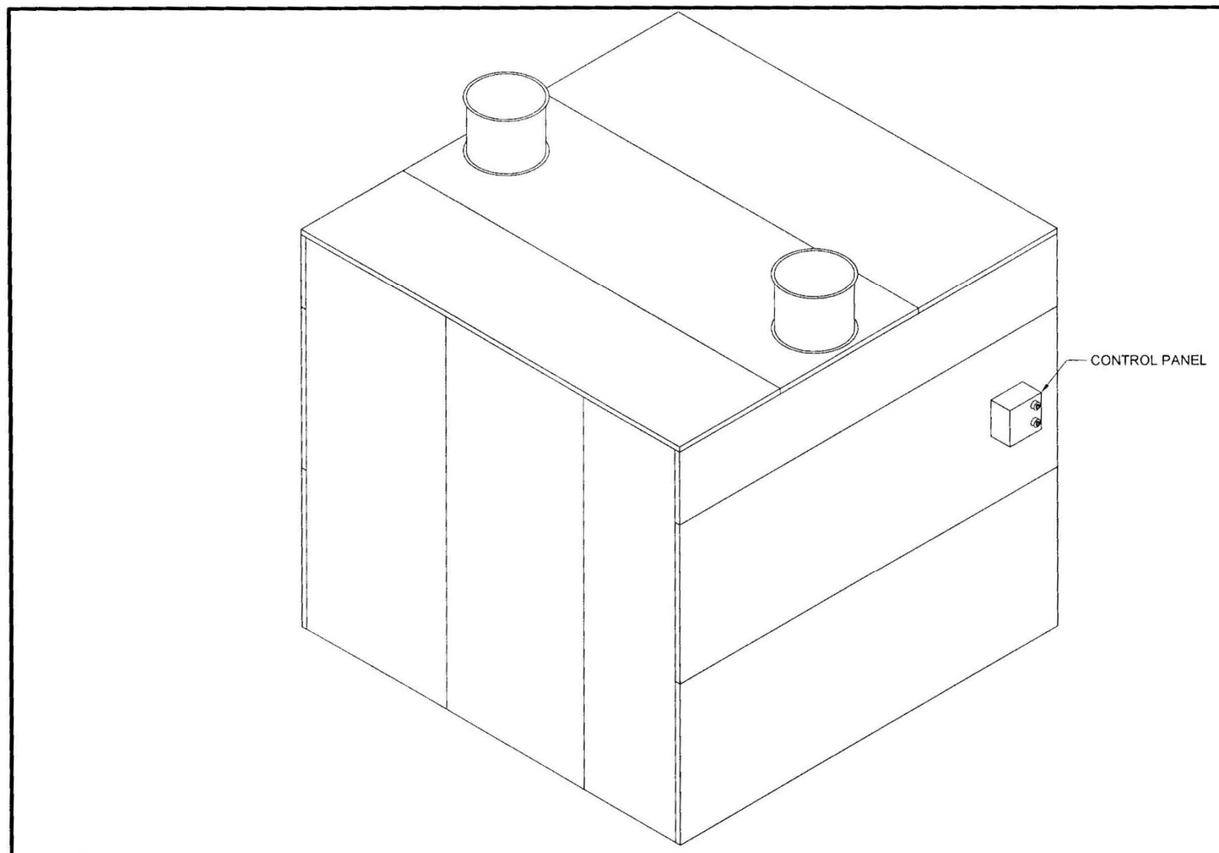

NOTES:
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FACING IN UNLESS OTHERWISE NOTED

		SHEET TITLE: LEFT REAR VIEW	C1D1 LABS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	DRAWING TITLE: EB10910	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.
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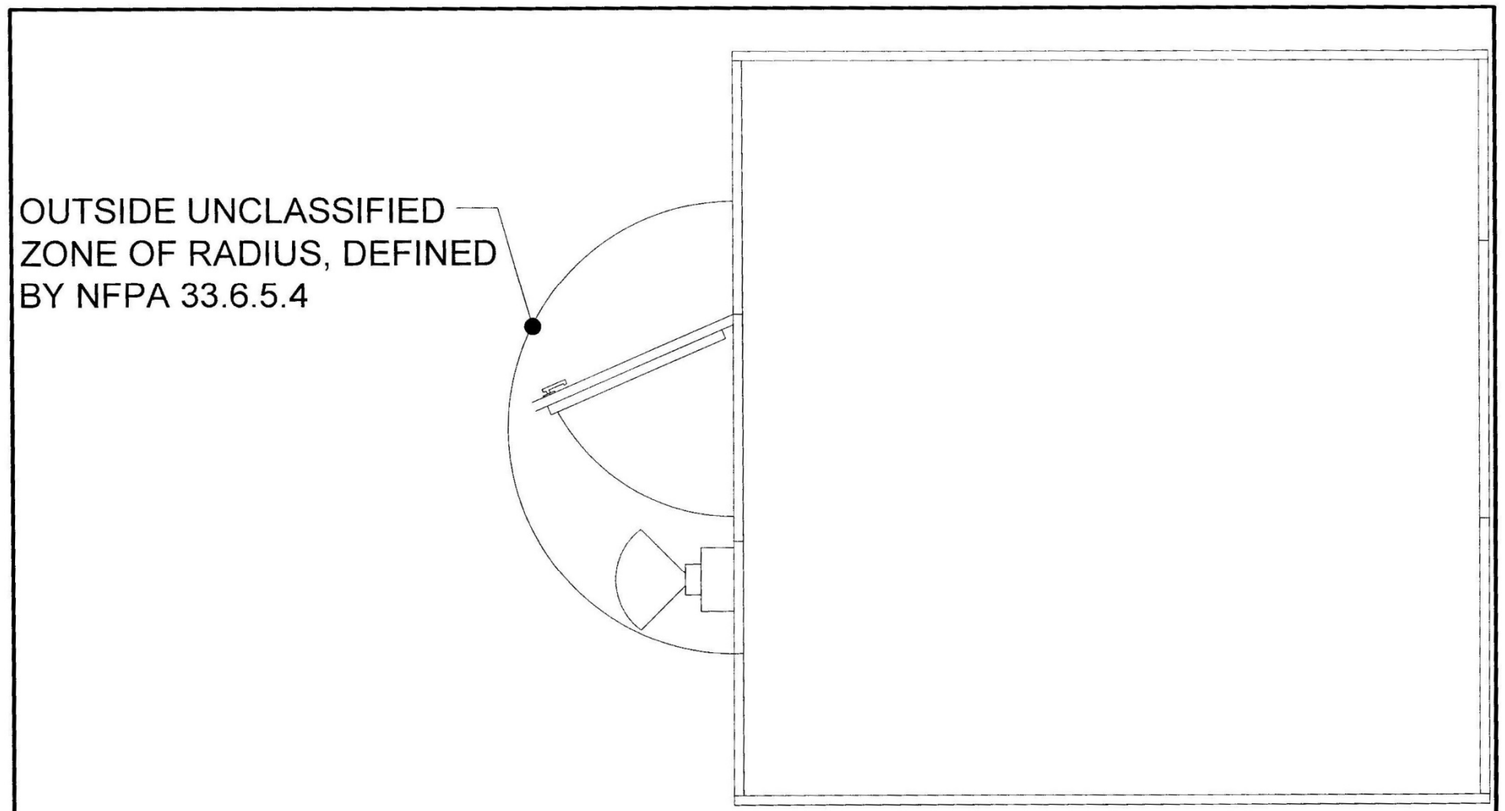

NOTES:
PANELS HAVE SMOOTH SURFACE
FACING IN UNLESS OTHERWISE NOTED

		SHEET TITLE: FLOOR PLAN	C1D1 LABS	C1D1 LABS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	DRAWING TITLE: EB10910	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.	
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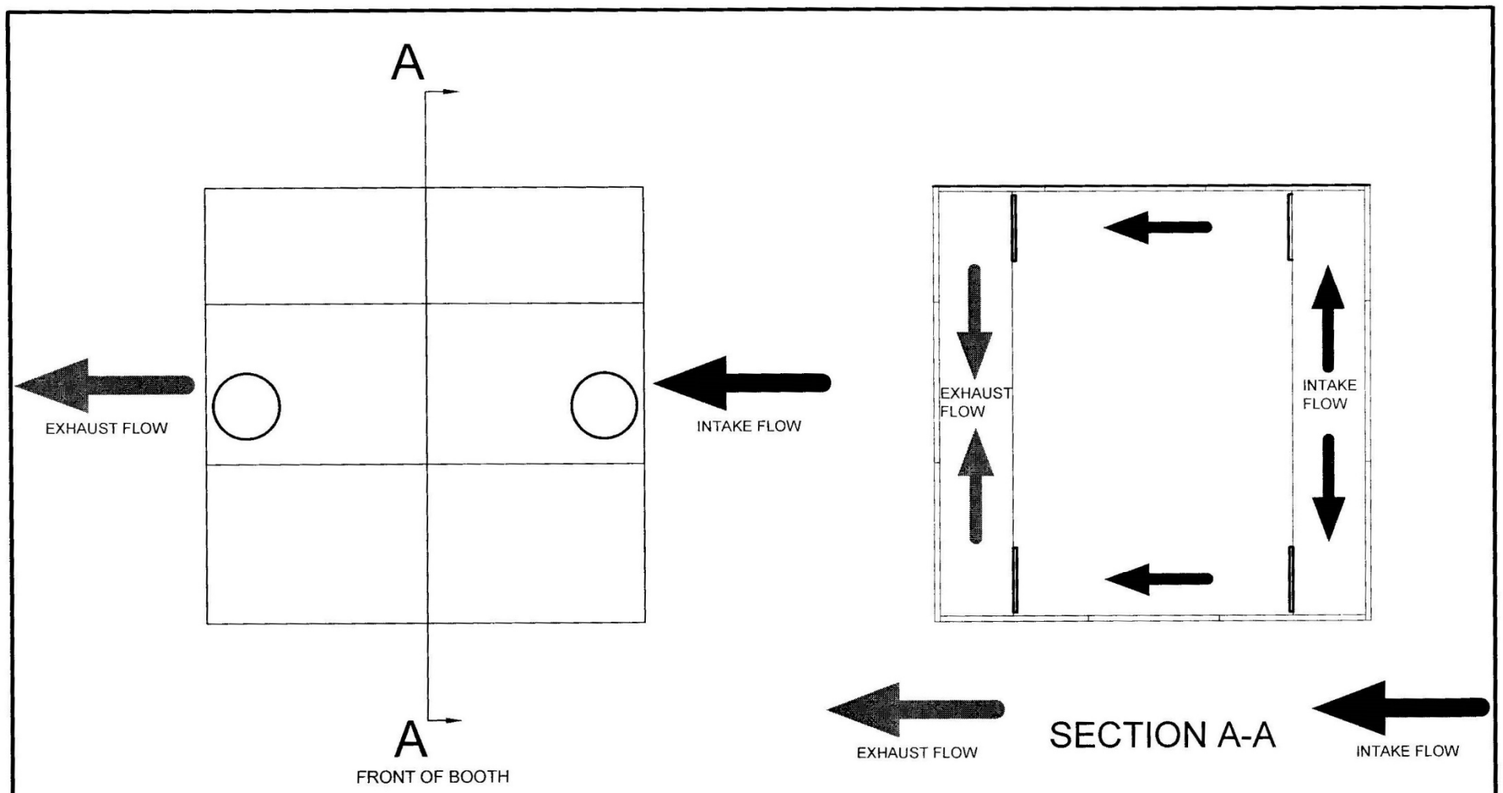

		SHEET TITLE: SECTION VIEW A-A - AIR FLOW DIAGRAM	C1D1 LABS	C1D1 LABS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	DRAWING TITLE: EB10910	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.	
		SHEET SIZE: A / REVISION: 0	SCALE: N/A / DATE: 21-Nov-18	SHEET: 5

GENERAL INFO

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VENTILATION

THIS BOOTH INCLUDES A SINGLE SPARK RESISTANT, EXPLOSION PROOF EXHAUST FAN AND IS PROVIDED WITH AN IDENTIFICATION PLATE THAT NOTES "BASE AIR FLOWRATE = 500 CFM" AND "PURGE AIR FLOWRATE = 1,500 CFM" PER 2016 CALIFORNIA MECHANICAL CODE SECTION 503.2 REQUIREMENTS. THE EXHAUST FAN OPERATION IS INTERLOCKED TO OPERATE AT A BASEFLOW RATE OF 500 CFM WHEN LIGHTING AND OTHER COMPONENTS ARE BEING USED PER NFPA 1.386.3.2.4. WHEN 10%LEL IS DETECTED THROUGH THE HYDROCARBON MONITIORING SYSTEM, THE EXHAUST FAN RAMPS UP TO THE PURGE FLOWRATE OF 1,500 CFM UNTIL MONITORING LEVEL RETURNS TO 0%.

THE EXHAUST FAN SPEED IS CONTROLLED BY A VARIABLE FREQUENCY DRIVE (VFD). THE PROVIDED VFD IS PROGRAMMED TO OPERATE AT 30 HZ FOR THE BASE AIR FLOWRATE OF 500 CFM AND 60 HZ FOR THE PURGE AIR FLOWRATE OF 1,500 CFM. OWNER MAY BE REQUIRED TO BALANCE SYSTEM IN FIELD BASED ON CONNECTED DUCTING SYSTEMS.

ALL DUCTWORK PROVIDED WITH THE BOOTH IS GALVANIZED STEEL PER NFPA 33.7.8.

HYDROCARBON MONITORING SYSTEM

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ADDITIONAL NOTES

VERIFY ALL ADDITIONAL REQUIREMENTS WITH THE AUTHORITY HAVING JURISDICTION (AHJ).

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OWNER SHALL HIRE A PROFESSIONAL MECHANICAL ENGINEER TO DESIGN, SPECIFY AND SIZE THE ADDITIONAL MECHANICAL DUCTWORK AND SYSTEMS; AND AUTOMATIC FIRE PROTECTION SYSTEMS AS REQUIRED PER PER NFPA 1, SECTION 38.6.2.6.

THE OWNER SHALL HIRE A LICENSED MECHANICAL CONTRACTOR WITH CURRENT C-10 LICENSE ISSUED BE THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE MECHANICAL DEVICES.

THE OWNER SHALL HIRE A CONTRACTOR WITH CURRENT C-16 LICENSE ISSUED BY THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE FIRE PROTECTION SYSTEMS.

OWNER SHALL PROVIDE MAKE UP AIR AND EXHAUST DUCTING TO/FROM OUTSIDE THE BUILDING PER NFPA 33 SECTIONS 7.3, 7.4, 7.5, 7.6, 7.7, AND 7.8

OWNER SHALL PROVIDE MEANS OF DISSIPATING STATIC CHARGE ACCUMULATION PER NFPA 1, SECTION 60.5.1.10.2.

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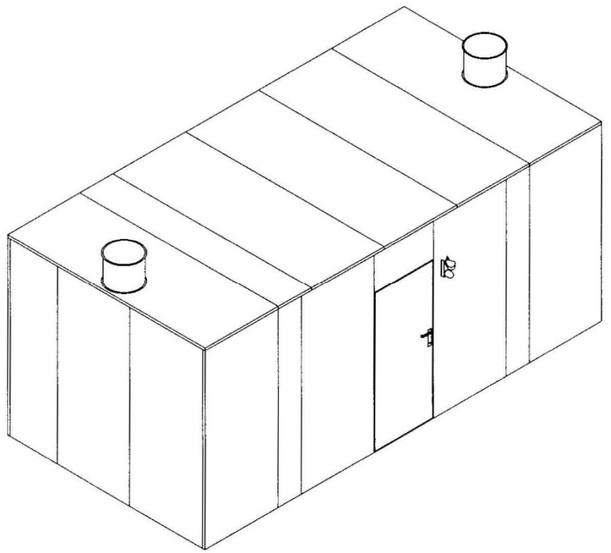
2016 CFC, 5803.1.3: COMPRESSED GAS SYSTEMS CONVEYING FLAMMABLE GASES SHALL BE PROVIDED WITH APPROVED MANUAL OR AUTOMATIC EMERGENCY SHUTOFF VALVES THAT CAN BE ACTIVATED AT EACHPOINT OF USE AND AT EACH SOURCE

EQUIPMENT LIST

QUANTITY	ITEM	DESCRIPTION
1	CONTROL PANEL	UL-LISTED, UL508A, (2) 1 TO 3 PHASE VARIABLE SPEED DRIVES, MICRO PLC
3	CONTROL SETTINGS	OFF, FAN ON, FAN AND LIGHTS ON
1	LIGHT ALARM	AMBER, CLASS 1, DIV. 2 RATED
1	SOUND ALARM	24V DC, 109 DB AT 1M
2	LED LIGHT	CLASS 1 - DIV 1 - T6 EXPLOSION PROOF LED
1	GAS DETECTOR	RKI M2A GAS DETECTOR
1	EMERGENCY STOP	CLASS 1 DIV 1 3 POSITION SWITCH
1	EXHAUST FAN	18H1849 SPR WITH VFD RATED (2 SPEED CONTROL)
1	INTAKE FAN	18H1849 SPR WITH VFD RATED (2 SPEED CONTROL)
1	AIR FLOW SHUT OFF SWITCH	

ALARM SET POINTS

AT 10% LEL AMBER LIGHT ALARM WILL START AND PURGE AIR FLOW RATE WILL RUN AT 1500 CFM
AT 25% LEL AMBER LIGHT ALARM, PURGE AIR FLOW RATE RUNS AT 1500 CFM, AND SOUND ALARM WILL START



MATERIAL: 18 GA G90 GALVANIZED STEEL

SHEET TITLE: EXTRACTION BOOTH

C1D1 LABS

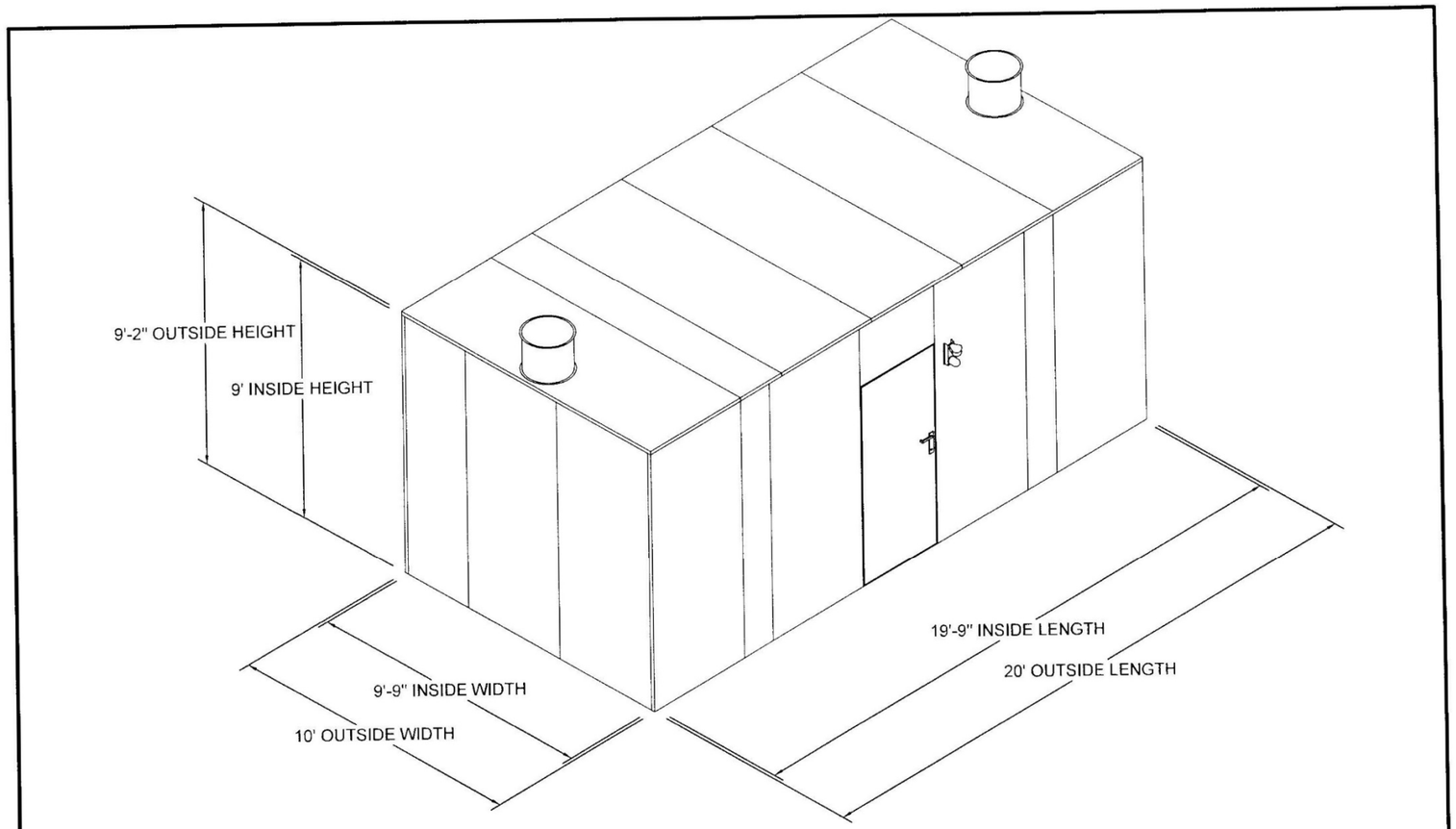
C1D1 LABS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"

THIRD ANGLE PROJECTION

DRAWING TITLE: EXB10920

SHEET SIZE: A | REVISION: 0 | SCALE: N/A | DATE: 9-Nov-18 | SHEET: 1



NOTES:
PANELS HAVE SMOOTH SURFACE FACING IN UNLESS OTHERWISE NOTED

SHEET TITLE: ISOMETRIC SECTION VIEW - FRONT RIGHT

C1D1 LABS

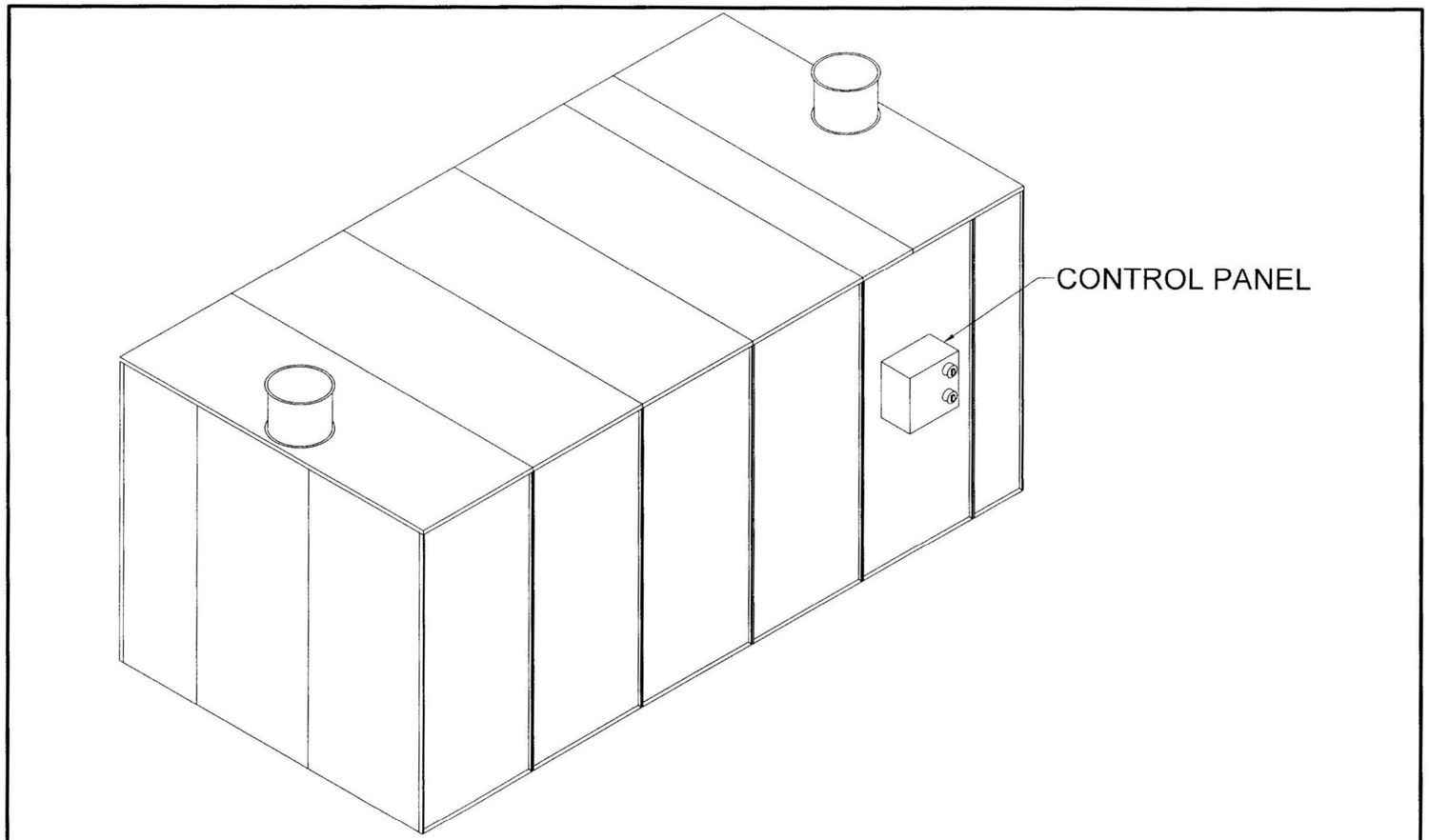
C1D1 LABS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"

THIRD ANGLE PROJECTION

DRAWING TITLE: EXB10920

SHEET SIZE: A | REVISION: 0 | SCALE: N/A | DATE: 9-Nov-18 | SHEET: 2



NOTES:
PANELS HAVE SMOOTH SURFACE FACING IN UNLESS OTHERWISE NOTED

SHEET TITLE: ISOMETRIC SECTION VIEW - LEFT REAR

C1D1 LABS

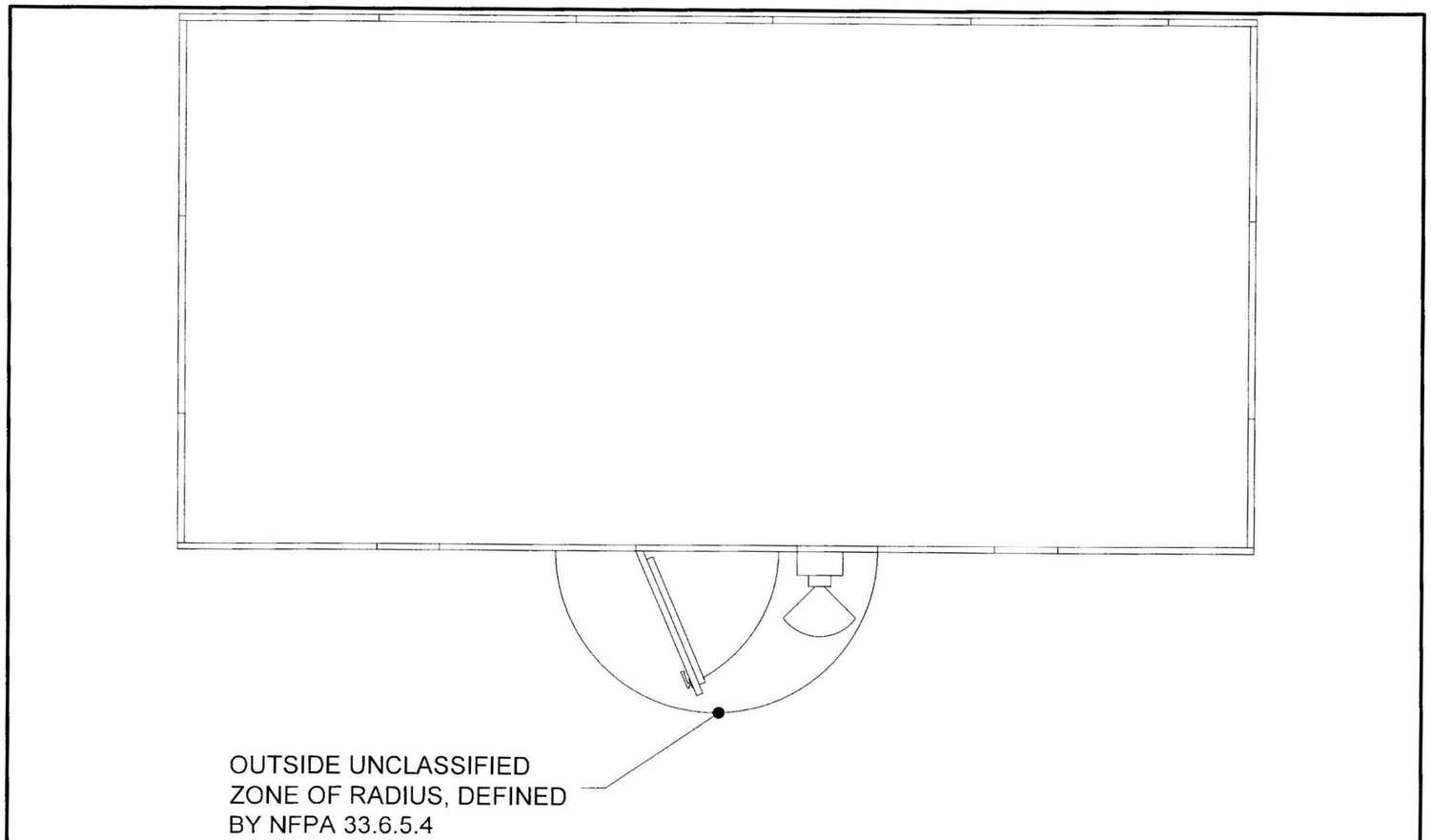
C1D1 LABS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN)
TOLERANCE: ± 1/8"

THIRD ANGLE PROJECTION

DRAWING TITLE: EXB10920

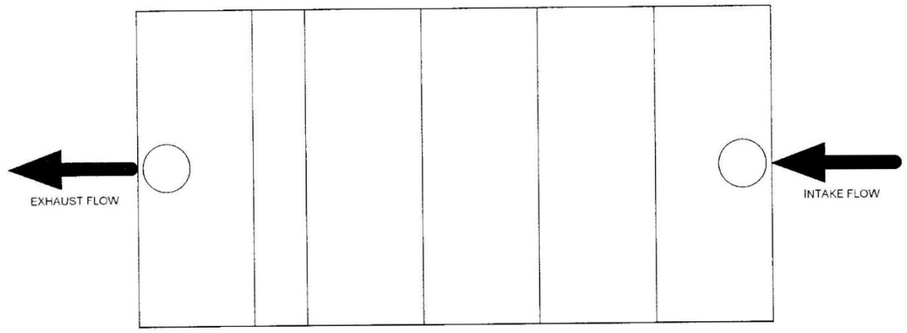
SHEET SIZE:	REVISION:		SCALE:	DATE:	SHEET:
A	0		N/A	9-Nov-18	3

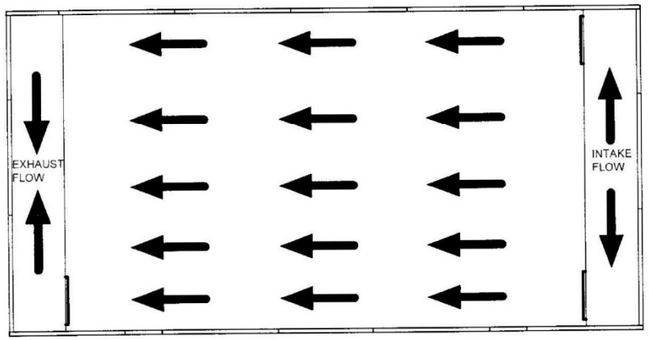


NOTES:
PANELS HAVE SMOOTH SURFACE
FACING IN UNLESS OTHERWISE NOTED

SHEET TITLE: FLOOR PLAN		C1D1 LABS	C1D1 LABS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	DRAWING TITLE: EXB10920	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.
		SHEET SIZE: A / REVISION: 0	SCALE: N/A / DATE: 9-Nov-18 / SHEET: 4

TOP VIEW





EXHAUST FLOW SECTION A-A INTAKE FLOW

NOTES:
PANELS HAVE SMOOTH SURFACE FACING IN UNLESS OTHERWISE NOTED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	SHEET TITLE: SECTION VIEW A-A - AIR FLOW DIAGRAM	C1D1 LABS	C1D1 LABS
		DRAWING TITLE: EXB10920	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.	
		SHEET SIZE: A / REVISION: 0	SCALE: N/A / DATE: 9-Nov-18	SHEET: 5

GENERAL INFO

HYDROCARBON EXTRACTION BOOTH IS MADE OF 18 GAUGE SHEET METAL AND IS NOT FIRE-RATED. THE SHEET METAL WALLS AND CEILING ASSEMBLIES ARE CONSTRUCTED TO MEET NFPA 33, SECTION 5.3.2. THIS BOOTH IS FOR INDOOR INSTALLATION ONLY ("ROOM WITHIN STRUCTURE"). "STRUCTURE" SHALL BE CONSTRUCTED PER NFPA 58 SECTION 10.3 REQUIREMENTS. PER NFPA 33, SECTION 5.5, THE BOOTH SHOULD BE INSTALLED AT LEAST 3 FEET FROM OTHER WORK STATIONS; THE BOOTH COULD BE ASSEMBLED WITHIN LIMITS IF A WALL, PARTITION, OR OUTER WALL AND MUST HAVE A 1 HR FIRE RESISTANCE RATING AS REQUIRED BY. BOOTHS CONNECTED TOGETHER ARE NOT CONSIDERED AS OTHER WORK AREAS.

VENTILATION

THIS BOOTH INCLUDES A SINGLE SPARK RESISTANT, EXPLOSION PROOF EXHAUST FAN AND IS PROVIDED WITH AN IDENTIFICATION PLATE THAT NOTES "BASE AIR FLOWRATE = 600 CFM" AND "PURGE AIR FLOWRATE = 2,000 CFM" PER 2016 CALIFORNIA MECHANICAL CODE, SECTION 503.2 REQUIREMENTS. THE EXHAUST FAN OPERATION IS INTERLOCKED TO OPERATE AT A BASEFLOW RATE OF 600 CFM WHEN LIGHTING AND OTHER COMPONENTS ARE BEING USED PER NFPA 1,386.3.2.4. WHEN 10%LEL IS DETECTED THROUGH THE HYDROCARBON MONITIORING SYSTEM, THE EXHAUST FAN RAMPS UP TO THE PURGE FLOWRATE OF 2,000CFM UNTIL MONITORING LEVEL RETURNS TO 0%.

THE EXHAUST FAN SPEED IS CONTROLLED BY A VARIABLE FREQUENCY DRIVE (VFD). THE PROVIDED VFD IS PROGRAMMED TO OPERATE AT 30 HZ FOR THE BASE AIR FLOWRATE OF 600 CFM AND 60 HZ FOR THE PURGE AIR FLOWRATE OF 2,000 CFM. OWNER MAY BE REQUIRED TO BALANCE SYSTEM IN FIELD BASED ON CONNECTED DUCTING SYSTEMS.

ALL DUCTWORK PROVIDED WITH THE BOOTH IS GALVANIZED STEEL PER NFPA 33 7.8.

HYDROCARBON MONITORING SYSTEM

THE BOOTH IS PROVIDED WITH AN EXPLOSION PROOF GENERAL PURPOSE MONITOR THAT MONITIORS HYDROCARBON LOWER EXPLOSIVE LIMIT (LEL). WHEN 10%LEL IS DETECTED THE VISUAL ALARM AND PURGE VENTILATION IS ENABLED UNTIL MONITORING LEVEL RETURNS TO 0%. WHEN 25%LEL IS DETECTED THE AUDIBLE ALARM IS ENABLED (WHILE VISUAL ALARM AND PURGE VENTILATION REMAINS ENABLED) UNTIL MONITORING LEVEL RETURNS TO 0%. THE MONITIOR, VISUAL ALARM AND AUDIBLE ALARM ARE INSTALLED INSIDE OF THE BOOTH. THE BOOTH INCLUDES AN INTERLOCK THAT IS WIRED TO THE AUDIBLE HORN TO ALARM, DEACTIVATION OF THE HEATING SYSTEM (OWNER TO COORDINATE) AND ACTIVATE THE PURGE EXHAUST VENTILATION, UPON FAILURE OF THE GAS DETECTION SYSTEM PER 2016 CALIFORNIA FIRE CODE SECTION 3805.1.4.

ADDITIONAL NOTES

VERIFY ALL ADDITIONAL REQUIREMENTS WITH THE AUTHORITY HAVING JURISDICTION (AHJ).

ANY ELECTRICAL, PLUMBING, OR OTHER PENETRATIONS INTO BOOTH MUST BE SEALED WITH FIRE STOPPING PER NFPA 91, SECTION 4.2.13.

OWNER SHALL HIRE A PROFESSIONAL MECHANICAL ENGINEER TO DESIGN, SPECIFY AND SIZE THE ADDITIONAL MECHANICAL DUCTWORK AND SYSTEMS, AND AUTOMATIC FIRE PROTECTION SYSTEMS AS REQUIRED PER PER NFPA 1, SECTION 38.6.2.6.

THE OWNER SHALL HIRE A LICENSED MECHANICAL CONTRACTOR WITH CURRENT C-10 LICENSE ISSUED BE THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE MECHANICAL DEVICES.

THE OWNER SHALL HIRE A CONTRACTOR WITH CURRENT C-16 LICENSE ISSUED BY THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE FIRE PROTECTION SYSTEMS.

OWNER SHALL PROVIDE MAKE UP AIR AND EXHAUST DUCTING TO/FROM OUTSIDE THE BUILDING PER NFPA 33 SECTIONS 7.3, 7.4, 7.5, 7.6, 7.7, AND 7.8

OWNER SHALL PROVIDE MEANS OF DISSIPATING STATIC CHARGE ACCUMULATION PER NFPA 1, SECTION 60.5.1.10.2.

C1D1 LABS WILL PROVIDE AN AIRFLOW SWITCH THAT IS WIRED TO THE AUDIBLE HORN TO ALARM UPON FAILURE OF THE VENTILATION SYSTEM. AIR FLOW SWITCH NEEDS TO BE INSTALLED IN THE EXHAUST VENTILATION BY OWNER, PER THE MANUFACTURER'S INSTRUCTIONS.

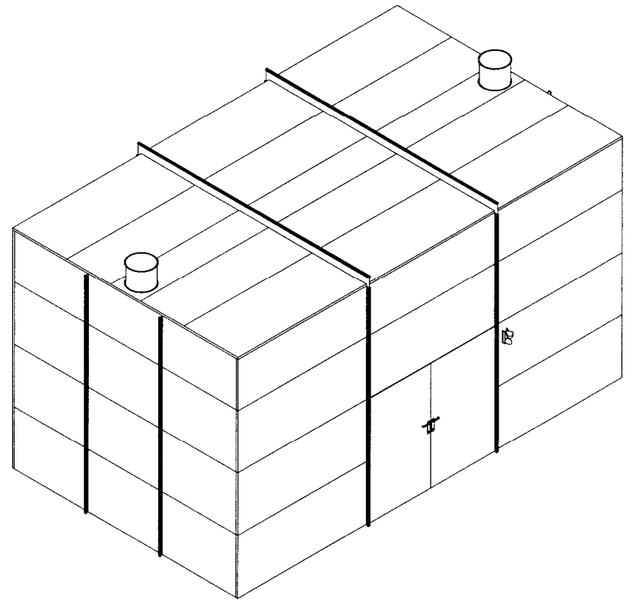
2016 CFC, 5803.1.3 COMPRESSED GAS SYSTEMS CONVEYING FLAMMABLE GASES SHALL BE PROVIDED WITH APPROVED MANUAL OR AUTOMATIC EMERGENCY SHUTOFF VALVES THAT CAN BE ACTIVATED AT EACHPOINT OF USE AND AT EACH SOURCE

EQUIPMENT LIST

QUANTITY	ITEM	DESCRIPTION
1	CONTROL PANEL	UL-LISTED, UL508A, (2) 1 TO 3 PHASE VARIABLE SPEED DRIVES, MICRO PLC
3	CONTROL SETTINGS	OFF, FAN ON, FAN AND LIGHTS ON
1	LIGHT ALARM	AMBER, CLASS 1, DIV. 2 RATED
1	SOUND ALARM	24V DC, 109 DB AT 1M
3	LED LIGHT	CLASS 1 - DIV 1 - T6 EXPLOSION PROOF LED
1	GAS DETECTOR	RKI M2A GAS DETECTOR
1	EMERGENCY STOP	CLASS 1 DIV 1 3 POSITION SWITCH
1	EXHAUST FAN	18H1849 SPR WITH VFD RATED (2 SPEED CONTROL)
1	INTAKE FAN	18H1849 SPR WITH VFD RATED (2 SPEED CONTROL)
1	AIR FLOW SHUT OFF SWITCH	

ALARM SET POINTS

AT 10% LEL AMBER LIGHT ALARM WILL START AND PURGE AIR FLOW RATE WILL RUN AT 2000 CFM.
AT 25% LEL AMBER LIGHT ALARM: PURGE AIR FLOW RATE RUNS AT 2000 CFM; AND SOUND ALARM WILL START



NOTES:
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FACING IN UNLESS OTHERWISE NOTED

		SHEET TITLE: EXTRACTION BOOTH	C1D1 LABS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES (IN) TOLERANCE: ± 1/8"	THIRD ANGLE PROJECTION	DRAWING TITLE: EXB151426	THIS DOCUMENT AND THE INFORMATION IT DISCLOSES IS THE EXCLUSIVE PROPERTY OF C1D1 LABS. ANY REPRODUCTION OR USE OF THIS DRAWING, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE PROPRIETOR ARE PROHIBITED.
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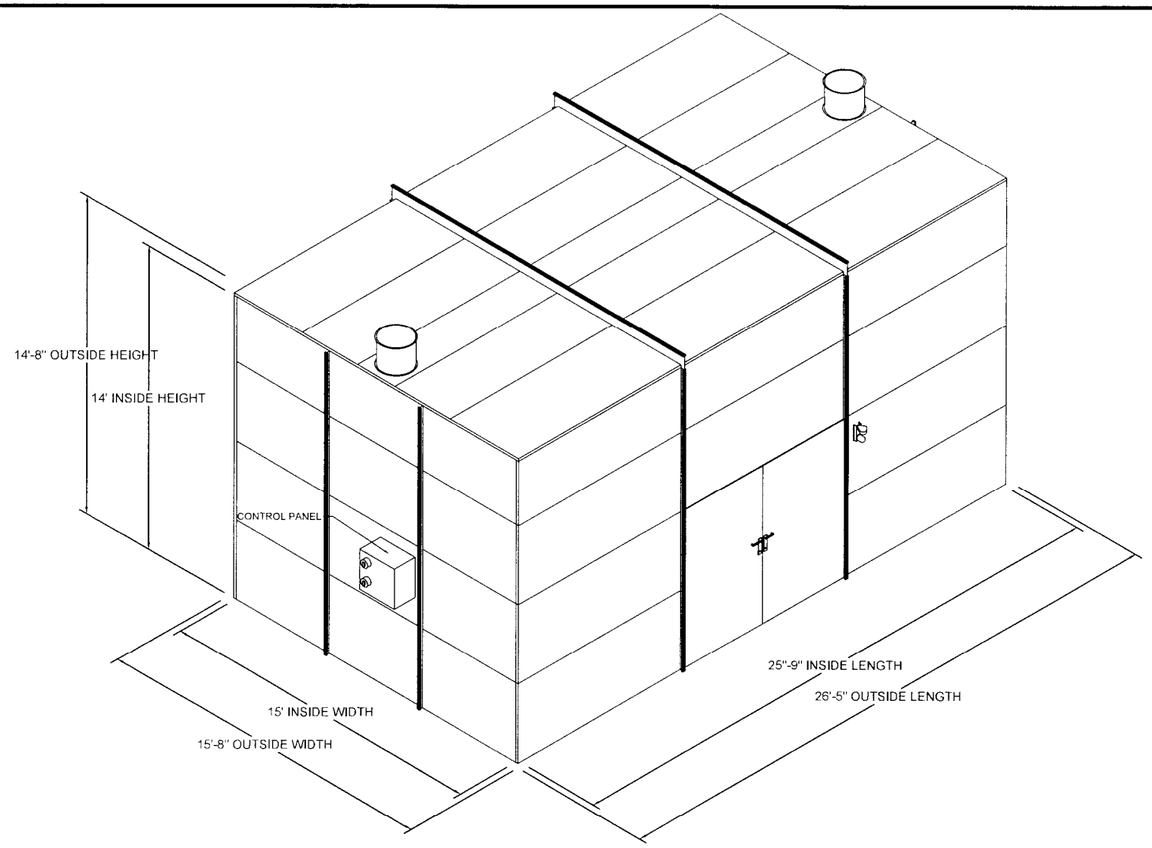

NOTES:
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		SHEET TITLE: FRONT RIGHT VIEW	C1D1 LABS	C1D1 LABS
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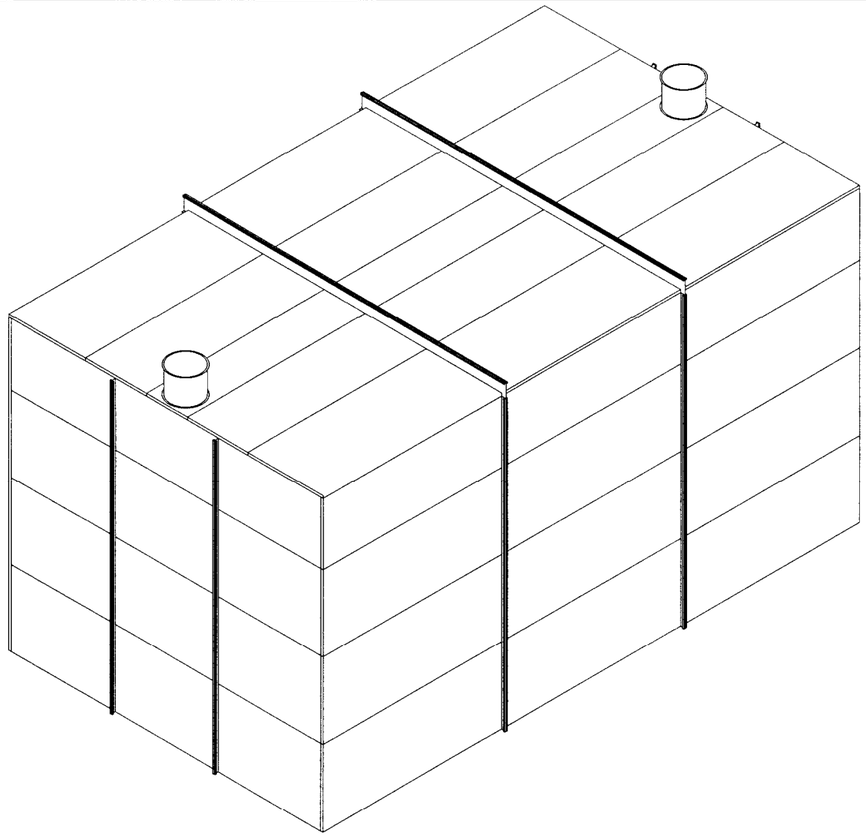

NOTES:
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		SHEET TITLE: LEFT REAR VIEW	C1D1 LABS	C1D1 LABS
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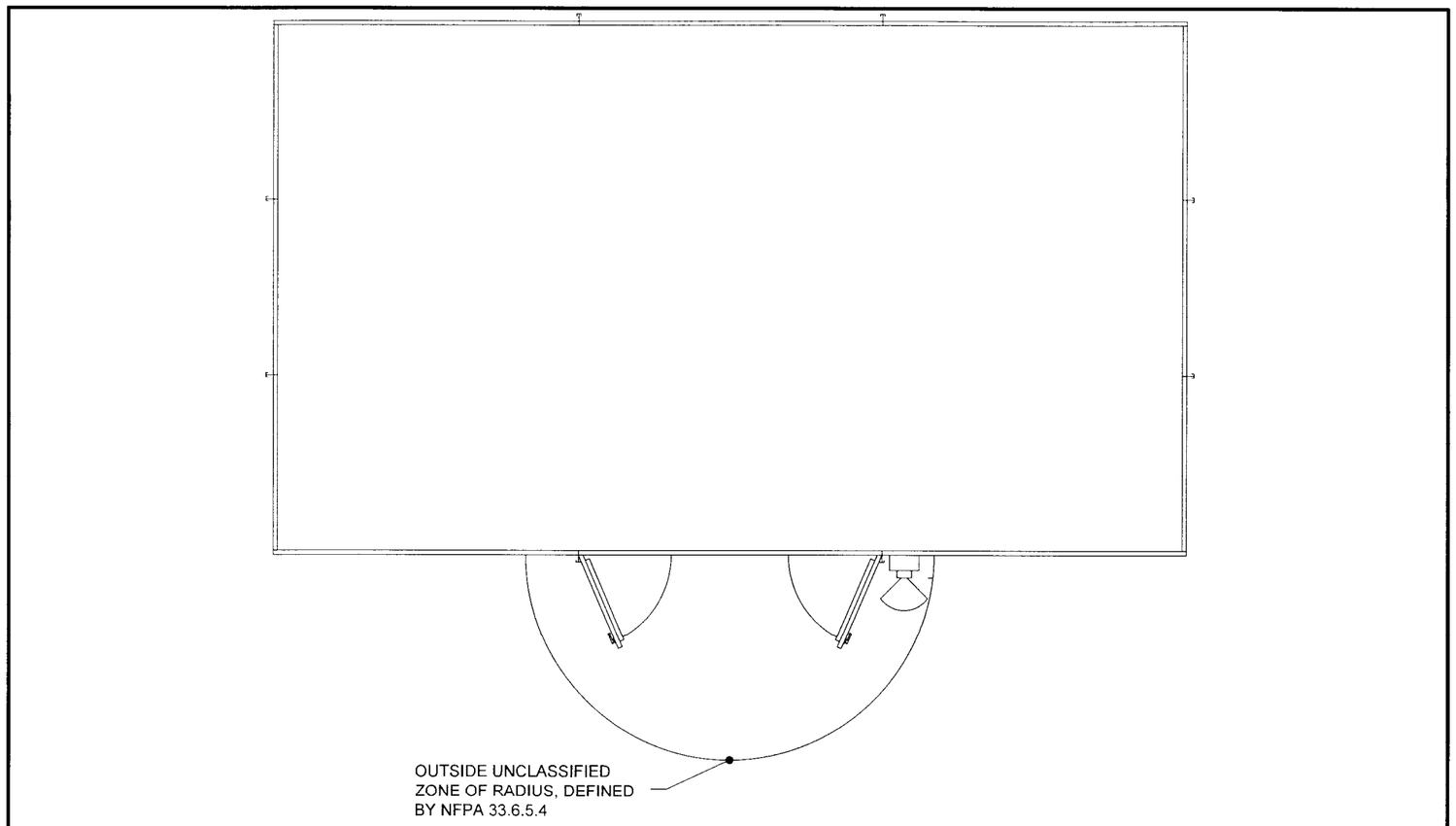
		SHEET SIZE: A / REVISION: 0	SCALE: N/A / DATE: 30-Oct-18	SHEET: 3



NOTES:
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		SHEET TITLE: FLOOR PLAN	C1D1 LABS	C1D1 LABS
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		SHEET SIZE: A / REVISION: 0	SCALE: N/A / DATE: 30-Oct-18	SHEET: 4

GENERAL INFORMATION:

HYDROCARBON EXTRACTION BOOTH IS MADE OF CORTEN STEEL AND IS NOT FIRE-RATED. THIS BOOTH IS FOR OUTDOOR AND INDOOR INSTILLATION. FOR INDOOR INSTILLATION: ("ROOM WITHIN STRUCTURE"). "STRUCTURE" SHALL BE CONSTRUCTED PER NFPA 58 SECTTION 10.3 REQUIREMENTS. PER NFPA 33, SECTION 5.5, THE BOOTH SHOULD BE INSTALLED AT LEAST 3 FEET FROM OTHER WORK STATIONS; THE BOOTH COULD BE ASSEMBLED WITHIN LIMITS IF A WALL, PARTITION, OR OUTER WALL AND MUST HAVE A 1 HR FIRE RESISTANCE RATING AS REQUIRED BY. BOOTHS CONNECTED TOGETHER ARE NOT CONSIDERED AS OTHER WORK AREAS.

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THE EXHAUST FAN SPEED IS CONTROLLED BY A VARIABLE FREQUENCY DRIVE (VFD). THE PROVIDED VFD IS PROGRAMMED TO OPERATE AT 30 HZ FOR THE BASE AIR FLOWRATE OF 500 CFM AND 60 HZ FOR THE PURGE AIR FLOWRATE OF 1,500 CFM. OWNER MAY BE REQUIRED TO BALANCE SYSTEM IN FIELD BASED ON CONNECTED DUCTING SYSTEMS.
FOR INDOOR USE: ALL DUCTWORK PROVIDED WITH THE BOOTH IS GALVANIZED STEEL PER NFPA 33.7.8.

HYDROCARBON MONITORING SYSTEM:

THE BOOTH IS PROVIDED WITH AN EXPLOSION PROOF GENERAL PURPOSE MONITOR THAT MONITIORS HYDROCARBON LOWER EXPLOSIVE LIMIT (LEL). WHEN 10%LEL IS DETECTED THE VISUAL ALARM AND PURGE VENTILATION IS ENABLED UNTIL MONITORING LEVEL RETURNS TO 0%. WHEN 25%LEL IS DETECTED THE AUDIBLE ALARM IS ENABLED (WHILE VISUAL ALARM AND PURGE VENTILATION REMAINS ENABLED) UNTIL MONITORING LEVEL RETURNS TO 0%. THE MONITIOR, VISUAL ALARM AND AUDIBLE ALARM ARE INSTALLED INSIDE OF THE BOOTH. THE BOOTH INCLUDES AN INTERLOCK THAT IS WIRED TO THE AUDIBLE HORN TO ALARM, DEACTIVATION OF THE HEATING SYSTEM (OWNER TO COORDINATE) AND ACTIVATE THE PURGE EXHAUST VENTILATION, UPON FAILURE OF THE GAS DETECTION SYSTEM PER 2016 CALIFORNIA FIRE CODE SECTION 3805.1.4.

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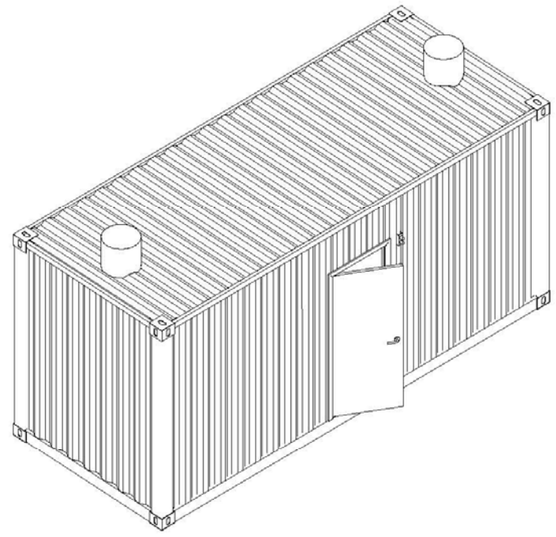
OWNER SHALL PROVIDE MAKE UP AIR AND EXHAUST DUCTING TO/FROM OUTSIDE THE BUILDING PER NFPA 33 SECTIONS 7.3, 7.4, 7.5, 7.6, 7.7, AND 7.8
OWNER SHALL PROVIDE MEANS OF DISSIPATING STATIC CHARGE ACCUMULATION PER NFPA 1, SECTION 60.5.1.10.2.
C1D1 LABS WILL PROVIDE AN AIRFLOW SWITCH THAT IS WIRED TO THE AUDIBLE HORN TO ALARM UPON FAILURE OF THE VENTILATION SYSTEM. AIR FLOW SWITCH NEEDS TO BE INSTALLED IN THE EXHAUST VENTILATION BY OWNER, PER THE MANUFACTURER'S INSTRUCTIONS.
2016 CFC, 5803.1.3: COMPRESSED GAS SYSTEMS CONVEYING FLAMMABLE GASES SHALL BE PROVIDED WITH APPROVED MANUAL OR AUTOMATIC EMERGENCY SHUTOFF VALVES THAT CAN BE ACTIVATED AT EACHPOINT OF USE AND AT EACH SOURCE



1 3D VIEW 1

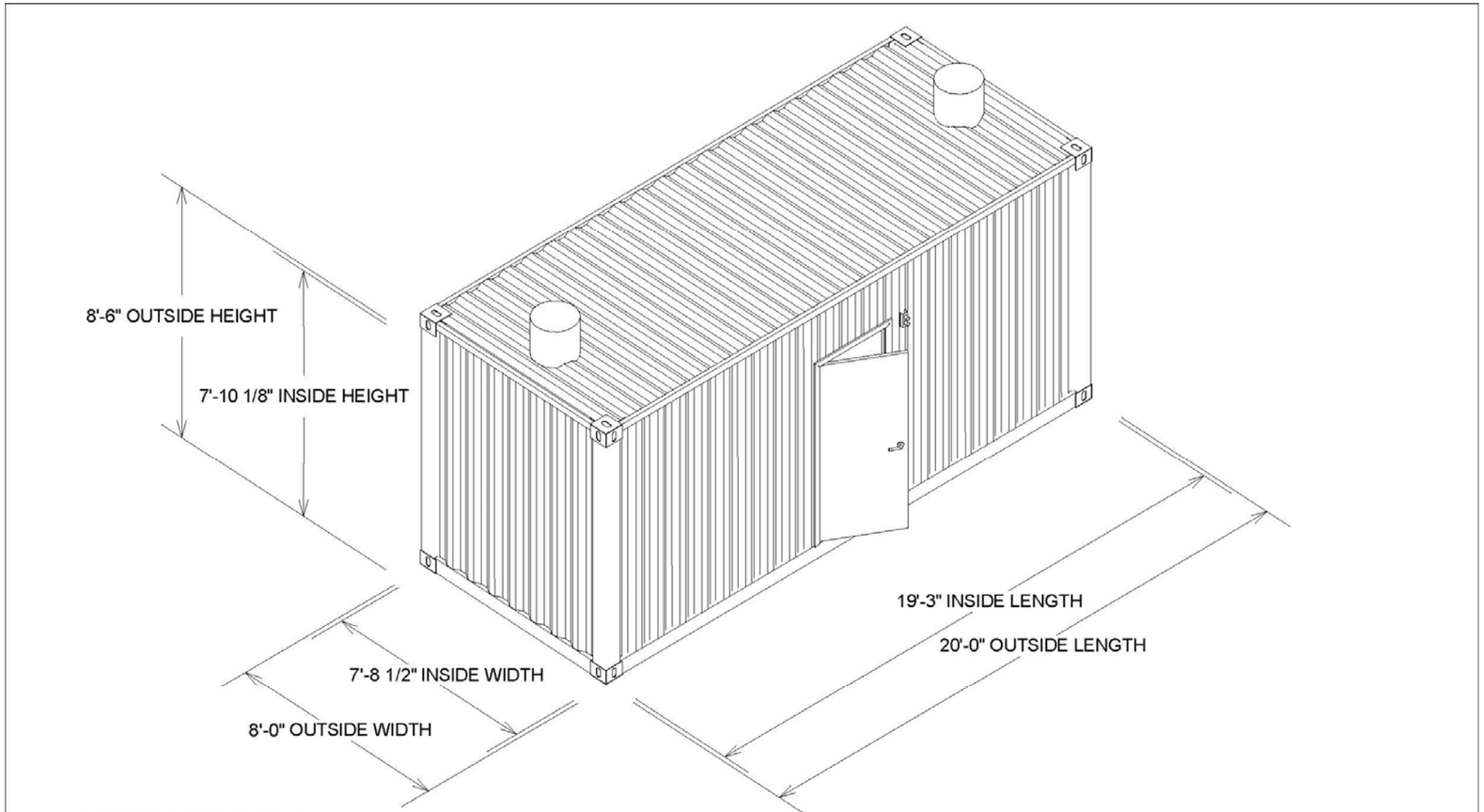
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH **8' x 20'**

EXTRACTION BOOTH

1

12/21/18



1 ISOMETRIC VIEW 1

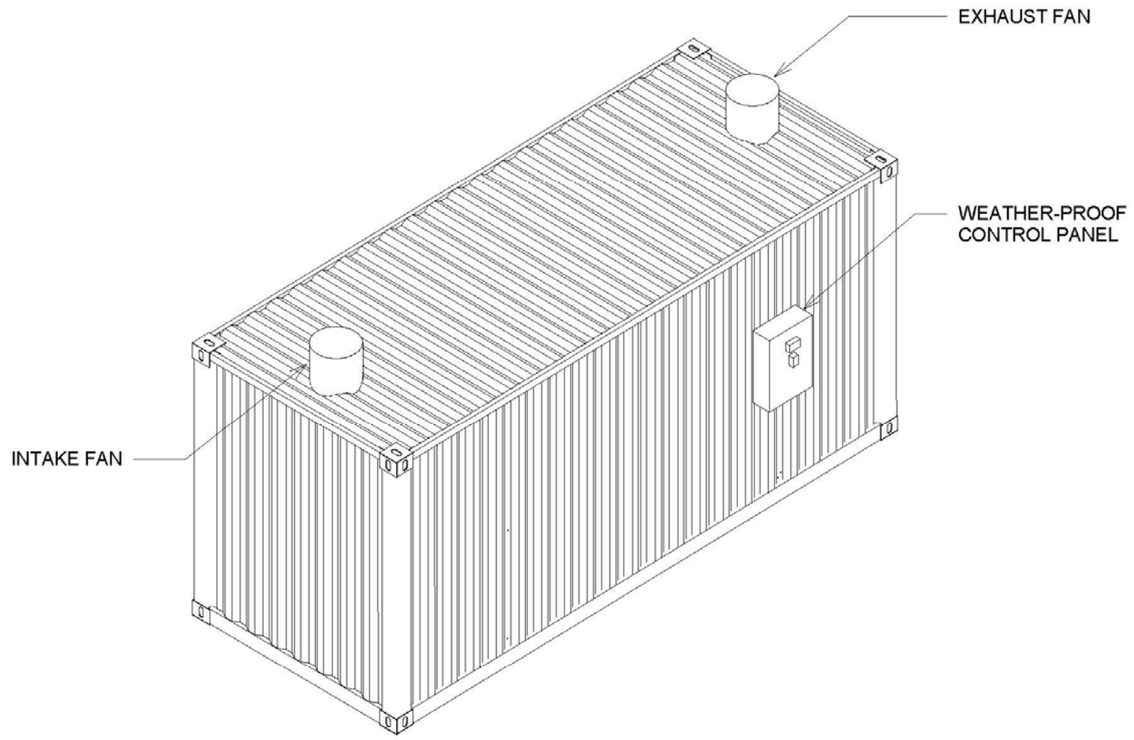
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' x 20'

ISOMETRIC VIEW 1

2

12/21/18



1 ISOMETRIC VIEW 2

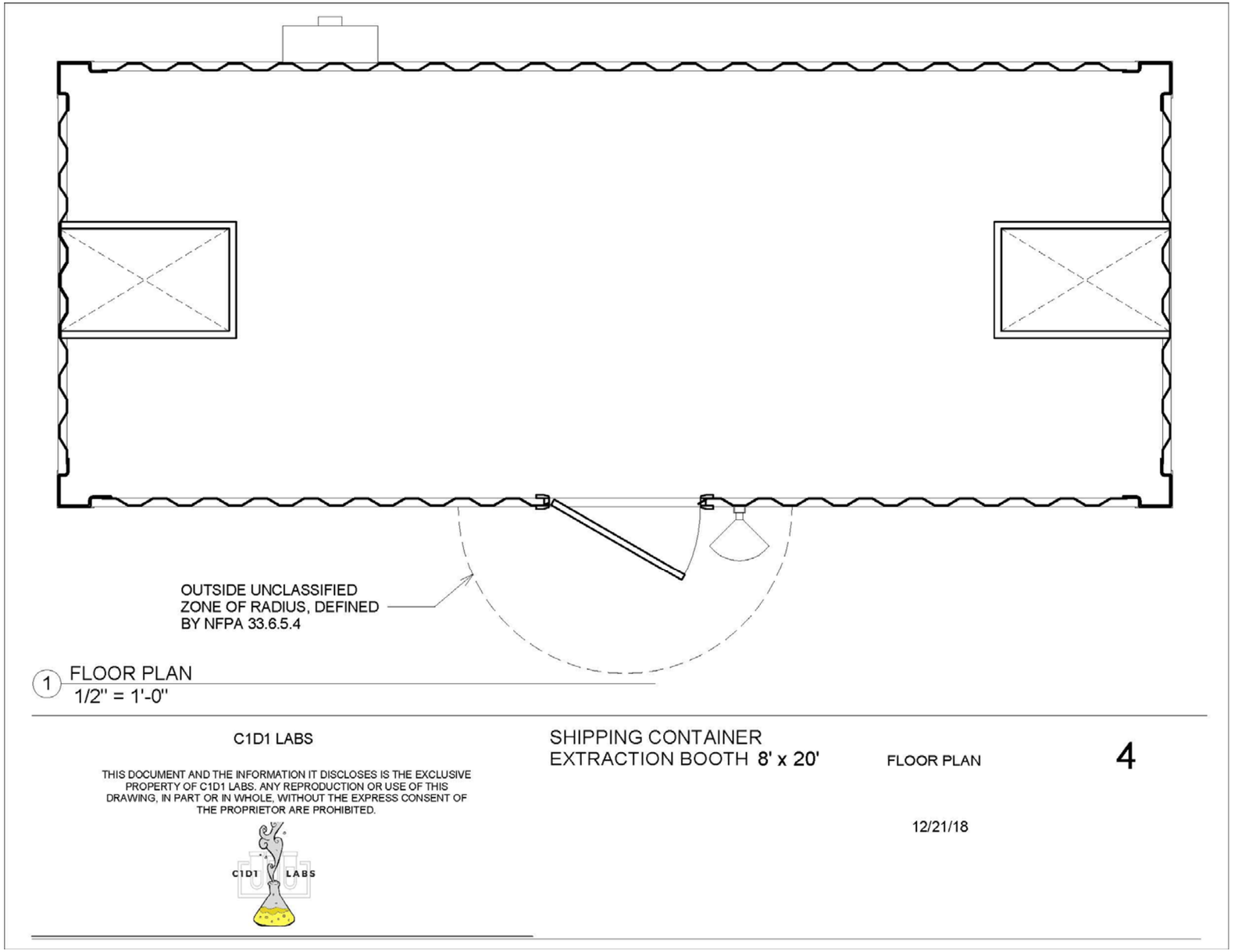
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' x 20'

ISOMETRIC VIEW 2

3

12/21/18



1 FLOOR PLAN
1/2" = 1'-0"

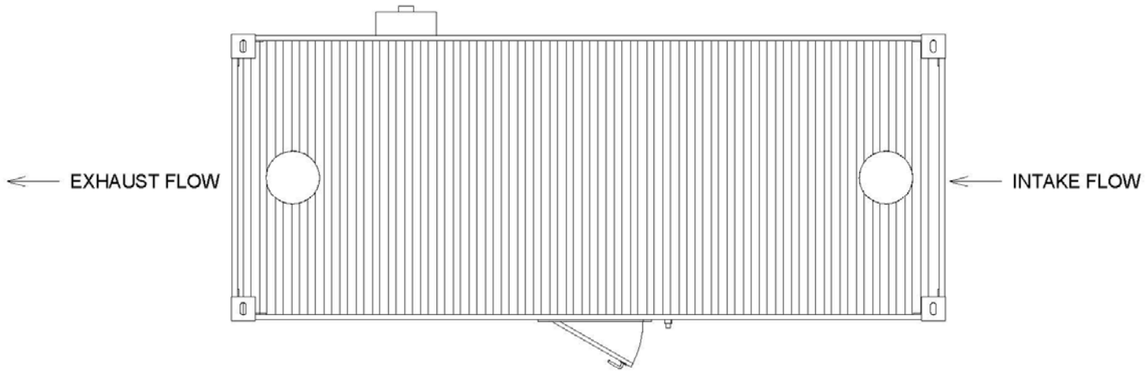
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' x 20'

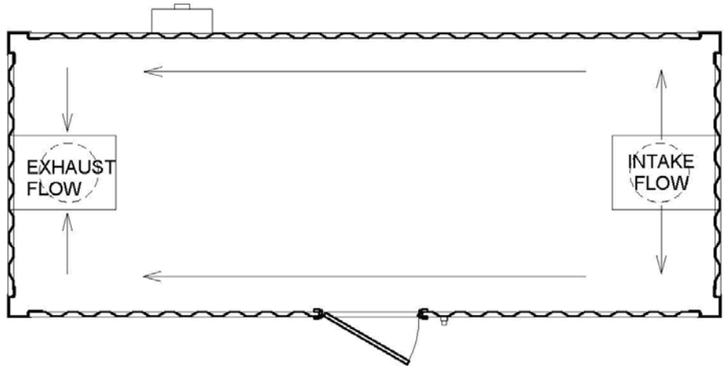
FLOOR PLAN

4

12/21/18



1 ROOF PLAN
1/4" = 1'-0"



2 FLOOR PLAN - EXHAUST
1/4" = 1'-0"

C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' x 20'

AIR FLOW DIAGRAM

5

12/21/18

GENERAL INFORMATION:

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VENTILATION:

THIS BOOTH INCLUDES A SINGLE SPARK RESISTANT, EXPLOSION PROOF EXHAUST FAN AND IS PROVIDED WITH AN IDENTIFICATION PLATE THAT NOTES "BASE AIR FLOWRATE = 500 CFM" AND "PURGE AIR FLOWRATE = 1,500 CFM" PER 2016 CALIFORNIA MECHANICAL CODE SECTION 503.2 REQUIREMENTS. THE EXHAUST FAN OPERATION IS INTERLOCKED TO OPERATE AT A BASEFLOW RATE OF 500 CFM WHEN LIGHTING AND OTHER COMPONENTS ARE BEING USED PER NFPA 1.386.3.2.4. WHEN 10% LEL IS DETECTED THROUGH THE HYDROCARBON MONITIORING SYSTEM, THE EXHAUST FAN RAMPS UP TO THE PURGE FLOWRATE OF 1,500 CFM UNTIL MONITORING LEVEL RETURNS TO 0%.
THE EXHAUST FAN SPEED IS CONTROLLED BY A VARIABLE FREQUENCY DRIVE (VFD). THE PROVIDED VFD IS PROGRAMMED TO OPERATE AT 30 HZ FOR THE BASE AIR FLOWRATE OF 500 CFM AND 60 HZ FOR THE PURGE AIR FLOWRATE OF 1,500 CFM. OWNER MAY BE REQUIRED TO BALANCE SYSTEM IN FIELD BASED ON CONNECTED DUCTING SYSTEMS.
FOR INDOOR USE: ALL DUCTWORK PROVIDED WITH THE BOOTH IS GALVANIZED STEEL PER NFPA 33.7.8.

HYDROCARBON MONITORING SYSTEM:

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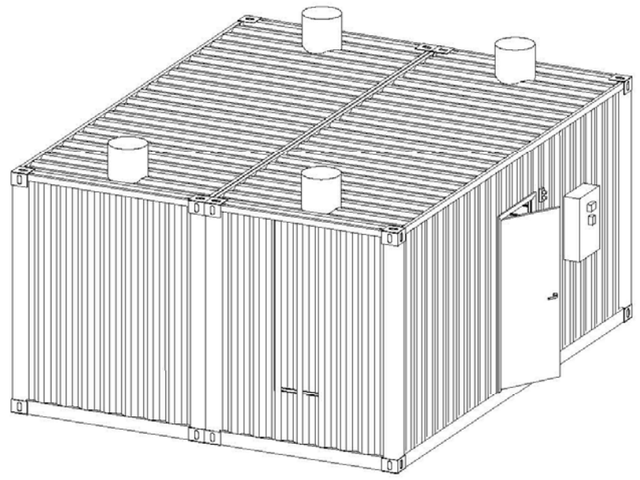


1 3D VIEW 1

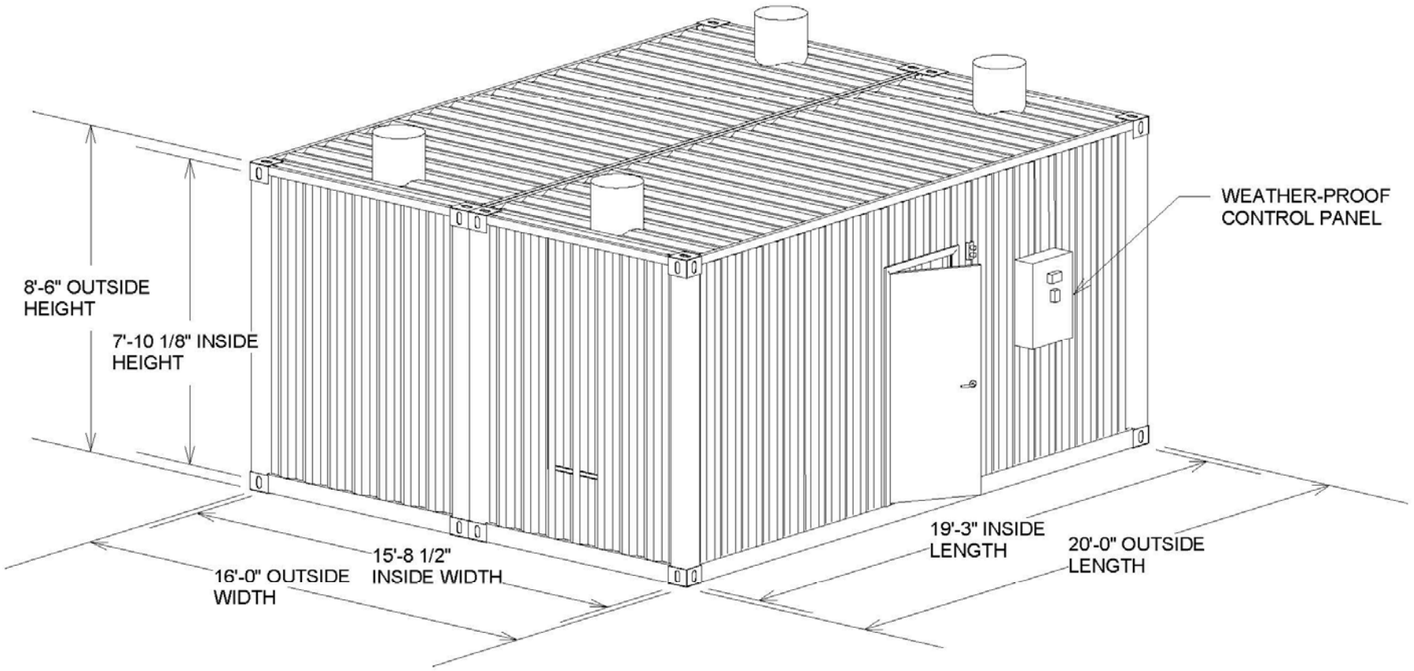
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH (2) 8' x 20'

EXTRACTION BOOTH

1

12/21/18



1 ISOMETRIC VIEW 1

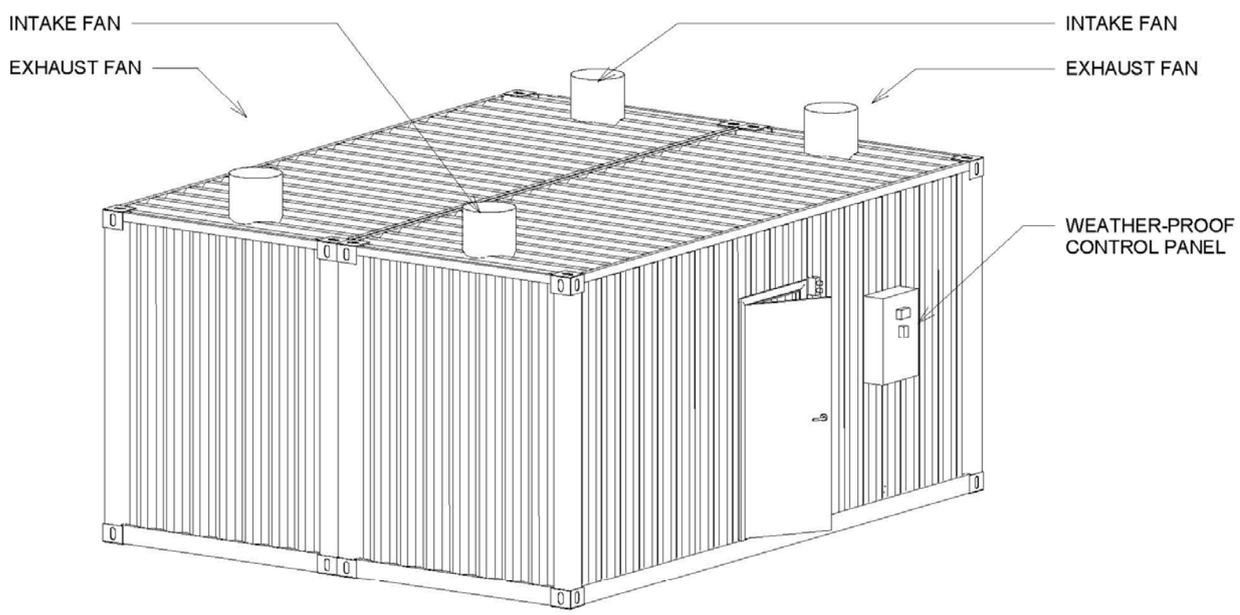
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH (2) 8' x 20'

ISOMETRIC VIEW 1

2

12/21/18



1 ISOMETRIC VIEW 2

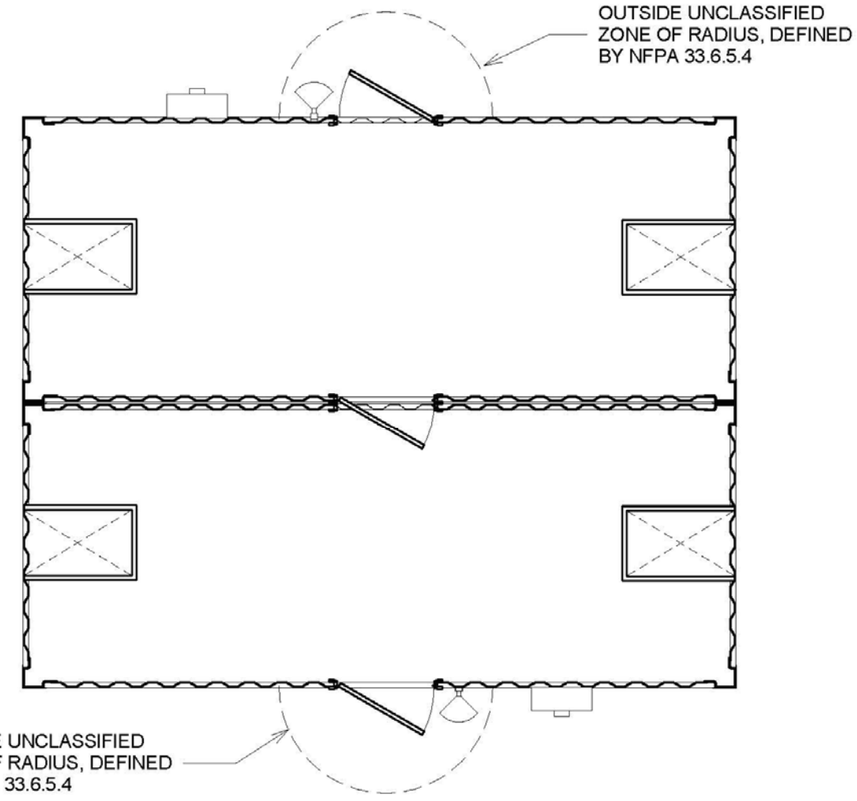
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH (2) 8' x 20'

ISOMETRIC VIEW 2

3

12/21/18



1 FLOOR PLAN
1/4" = 1'-0"

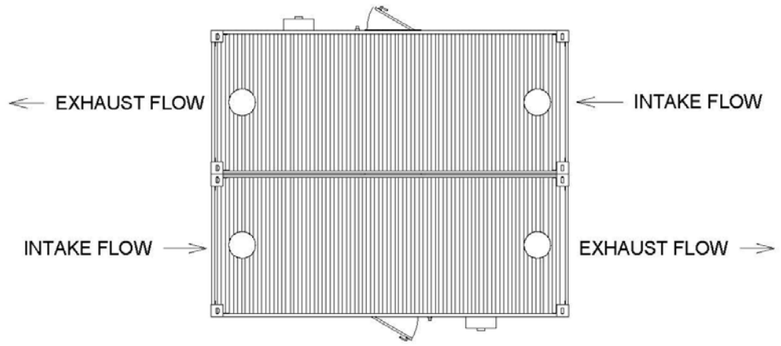
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH (2) 8' x 20'

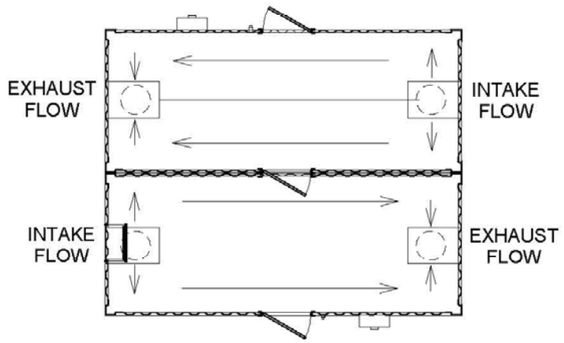
FLOOR PLAN

4

12/21/18



1 ROOF PLAN
1/8'' = 1'-0''



2 FLOOR PLAN - EXHAUST
1/8'' = 1'-0''

C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH (2) 8' x 20'

AIR FLOW DIAGRAM

5

12/21/18

GENERAL INFORMATION:

HYDROCARBON EXTRACTION BOOTH IS MADE OF CORTEN STEEL AND IS NOT FIRE-RATED. THIS BOOTH IS FOR OUTDOOR AND INDOOR INSTILLATION. FOR INDOOR INSTILLATION: ("ROOM WITHIN STRUCTURE"). "STRUCTURE" SHALL BE CONSTRUCTED PER NFPA 58 SECTTION 10.3 REQUIREMENTS. PER NFPA 33, SECTION 5.5, THE BOOTH SHOULD BE INSTALLED AT LEAST 3 FEET FROM OTHER WORK STATIONS; THE BOOTH COULD BE ASSEMBLED WITHIN LIMITS IF A WALL, PARTITION, OR OUTER WALL AND MUST HAVE A 1 HR FIRE RESISTANCE RATING AS REQUIRED BY. BOOTHS CONNECTED TOGETHER ARE NOT CONSIDERED AS OTHER WORK AREAS.

VENTILATION:

THIS BOOTH INCLUDES A SINGLE SPARK RESISTANT, EXPLOSION PROOF EXHAUST FAN AND IS PROVIDED WITH AN IDENTIFICATION PLATE THAT NOTES "BASE AIR FLOWRATE = 500 CFM" AND "PURGE AIR FLOWRATE = 1,500 CFM" PER 2016 CALIFORNIA MECHANICAL CODE SECTION 503.2 REQUIREMENTS. THE EXHAUST FAN OPERATION IS INTERLOCKED TO OPERATE AT A BASEFLOW RATE OF 500 CFM WHEN LIGHTING AND OTHER COMPONENTS ARE BEING USED PER NFPA 1.386.3.2.4. WHEN 10% LEL IS DETECTED THROUGH THE HYDROCARBON MONITIORING SYSTEM, THE EXHAUST FAN RAMPS UP TO THE PURGE FLOWRATE OF 1,500 CFM UNTIL MONITORING LEVEL RETURNS TO 0%.
THE EXHAUST FAN SPEED IS CONTROLLED BY A VARIABLE FREQUENCY DRIVE (VFD). THE PROVIDED VFD IS PROGRAMMED TO OPERATE AT 30 HZ FOR THE BASE AIR FLOWRATE OF 500 CFM AND 60 HZ FOR THE PURGE AIR FLOWRATE OF 1,500 CFM. OWNER MAY BE REQUIRED TO BALANCE SYSTEM IN FIELD BASED ON CONNECTED DUCTING SYSTEMS.
FOR INDOOR USE: ALL DUCTWORK PROVIDED WITH THE BOOTH IS GALVANIZED STEEL PER NFPA 33.7.8.

HYDROCARBON MONITORING SYSTEM:

THE BOOTH IS PROVIDED WITH AN EXPLOSION PROOF GENERAL PURPOSE MONITOR THAT MONITIORS HYDROCARBON LOWER EXPLOSIVE LIMIT (LEL). WHEN 10%LEL IS DETECTED THE VISUAL ALARM AND PURGE VENTILATION IS ENABLED UNTIL MONITORING LEVEL RETURNS TO 0%. WHEN 25%LEL IS DETECTED THE AUDIBLE ALARM IS ENABLED (WHILE VISUAL ALARM AND PURGE VENTILATION REMAINS ENABLED) UNTIL MONITORING LEVEL RETURNS TO 0%. THE MONITIOR, VISUAL ALARM AND AUDIBLE ALARM ARE INSTALLED INSIDE OF THE BOOTH. THE BOOTH INCLUDES AN INTERLOCK THAT IS WIRED TO THE AUDIBLE HORN TO ALARM, DEACTIVATION OF THE HEATING SYSTEM (OWNER TO COORDINATE) AND ACTIVATE THE PURGE EXHAUST VENTILATION, UPON FAILURE OF THE GAS DETECTION SYSTEM PER 2016 CALIFORNIA FIRE CODE SECTION 3805.1.4.

ADDITIONAL NOTES:
VERIFY ALL ADDITIONAL REQUIREMENTS WITH THE AUTHORITY HAVING JURISDICTION (AHJ).

ANY ELECTRICAL, PLUMBING, OR OTHER PENETRATIONS INTO BOOTH MUST BE SEALED WITH FIRE STOPPING PER NFPA 91, SECTION 4.2.13.
OWNER SHALL HIRE A PROFESSIONAL MECHANICAL ENGINEER TO DESIGN, SPECIFY AND SIZE THE ADDITIONAL MECHANICAL DUCTWORK AND SYSTEMS; AND AUTOMATIC FIRE PROTECTION SYSTEMS AS REQUIRED PER PER NFPA 1, SECTION 38.6.2.6.
THE OWNER SHALL HIRE A LICENSED MECHANICAL CONTRACTOR WITH CURRENT C-10 LICENSE ISSUED BE THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE MECHANICAL DEVICES.
THE OWNER SHALL HIRE A CONTRACTOR WITH CURRENT C-16 LICENSE ISSUED BY THE CALIFORNIA STATE LICENSE BOARD TO INSTALL THE FIRE PROTECTION SYSTEMS.
OWNER SHALL PROVIDE MAKE UP AIR AND EXHAUST DUCTING TO/FROM OUTSIDE THE BUILDING PER NFPA 33 SECTIONS 7.3, 7.4, 7.5, 7.6, 7.7, AND 7.8
OWNER SHALL PROVIDE MEANS OF DISSIPATING STATIC CHARGE ACCUMULATION PER NFPA 1, SECTION 60.5.1.10.2.
C1D1 LABS WILL PROVIDE AN AIRFLOW SWITCH THAT IS WIRED TO THE AUDIBLE HORN TO ALARM UPON FAILURE OF THE VENTILATION SYSTEM. AIR FLOW SWITCH NEEDS TO BE INSTALLED IN THE EXHAUST VENTILATION BY OWNER, PER THE MANUFACTURER'S INSTRUCTIONS.
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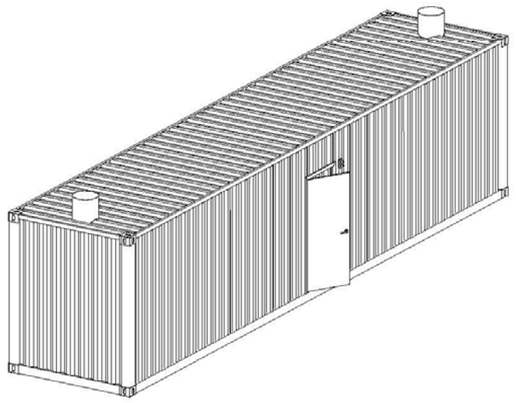


1 3D VIEW 1

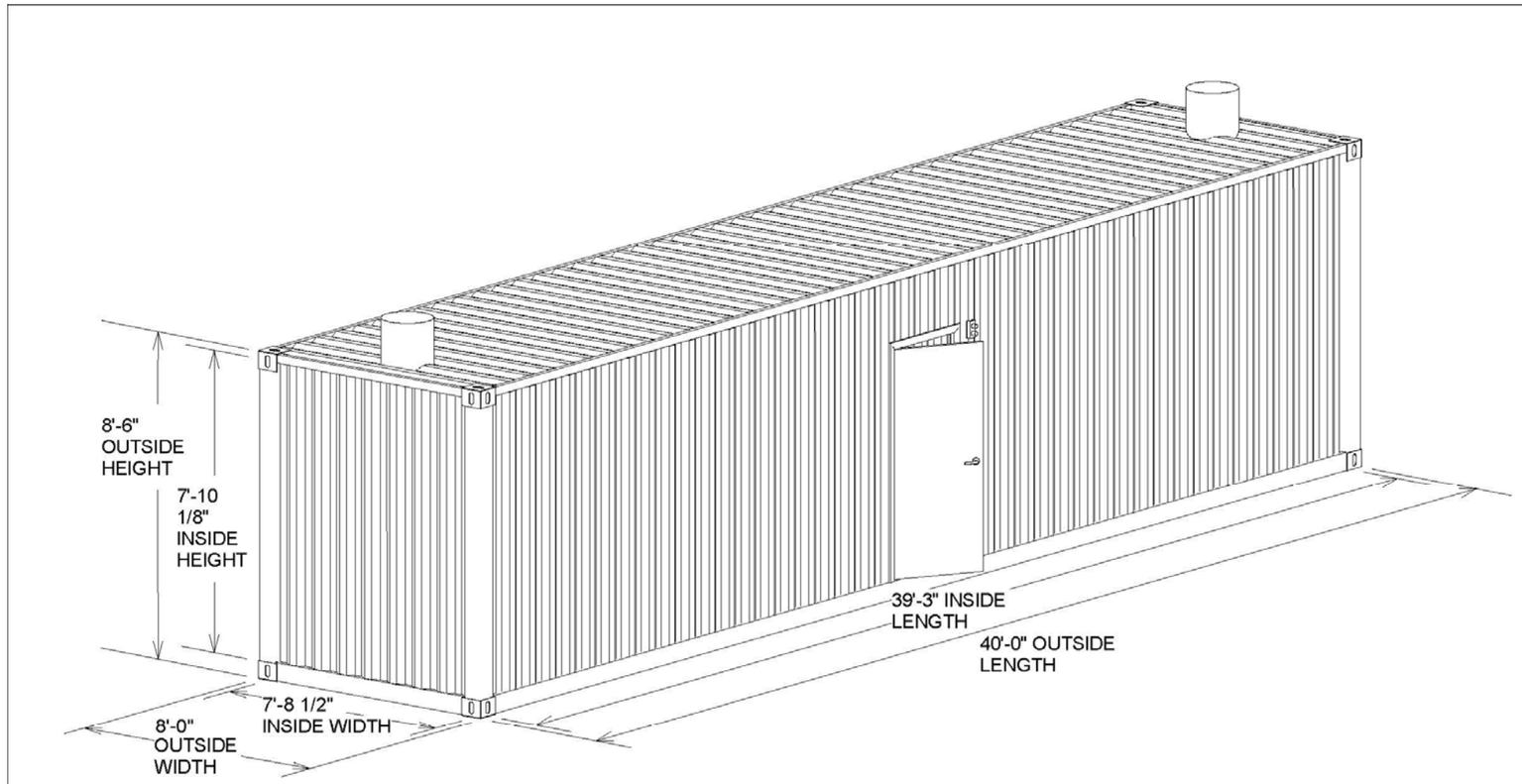
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' X 40'

EXTRACTION BOOTH

1

12/21/18



1 ISOMETRIC VIEW 1

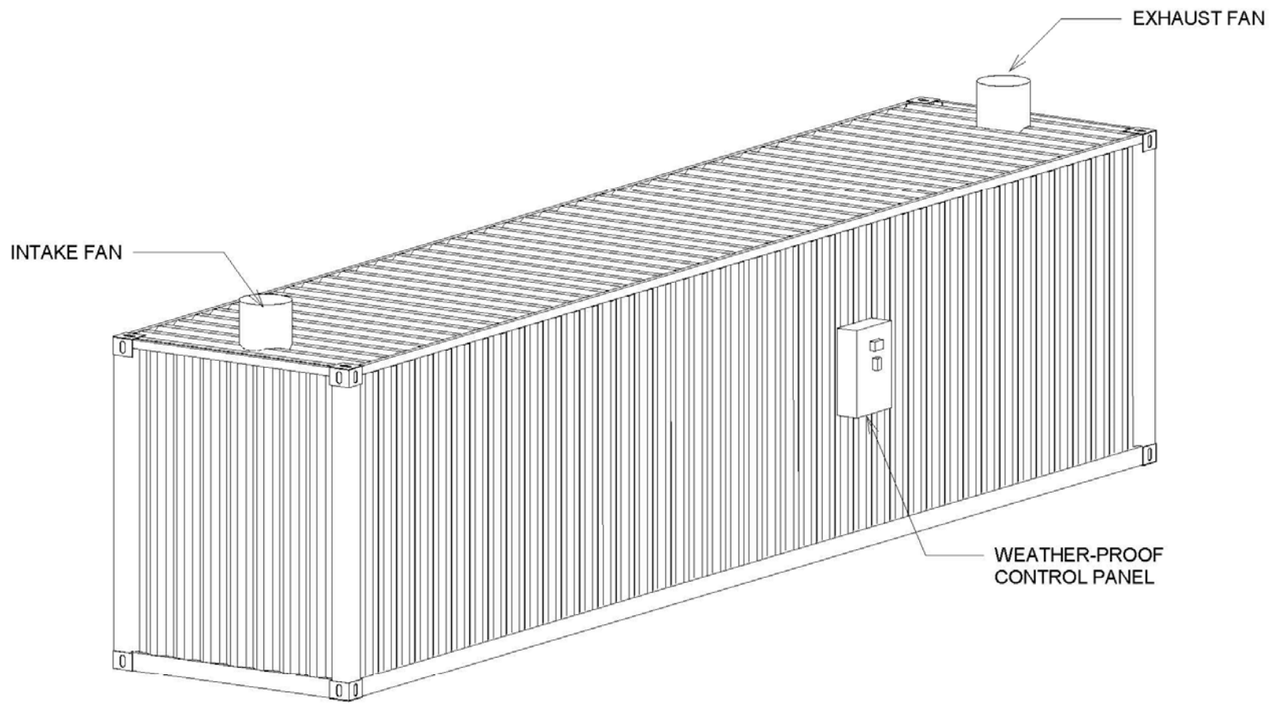
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' X 40'

ISOMETRIC VIEW 1

2

12/21/18



1 ISOMETRIC VIEW 2

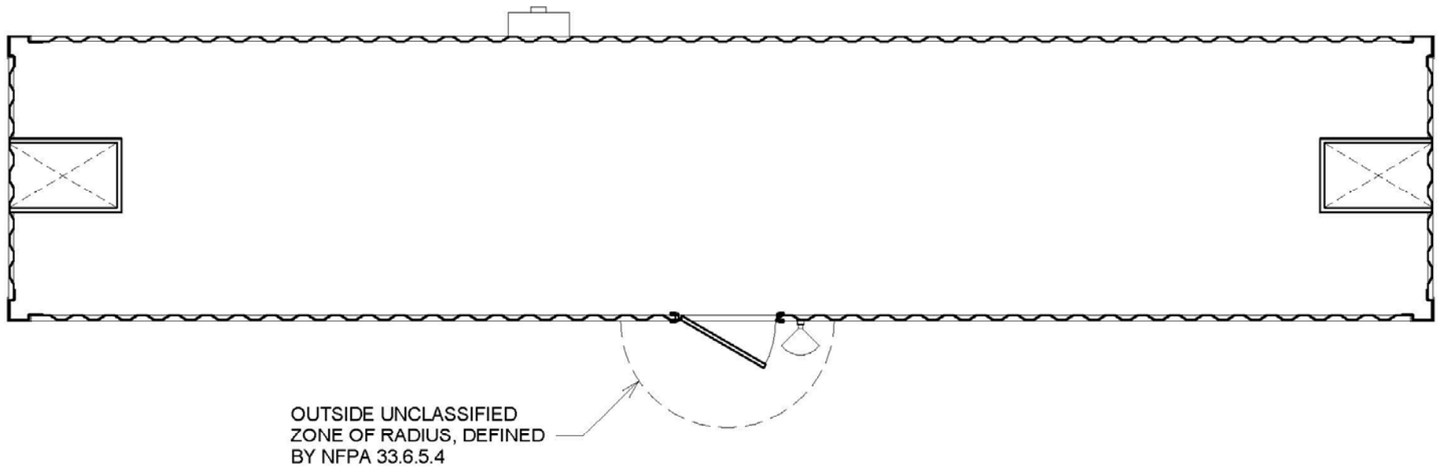
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' X 40'

ISOMETRIC VIEW 2

3

12/21/18



1 FLOOR PLAN
1/4" = 1'-0"

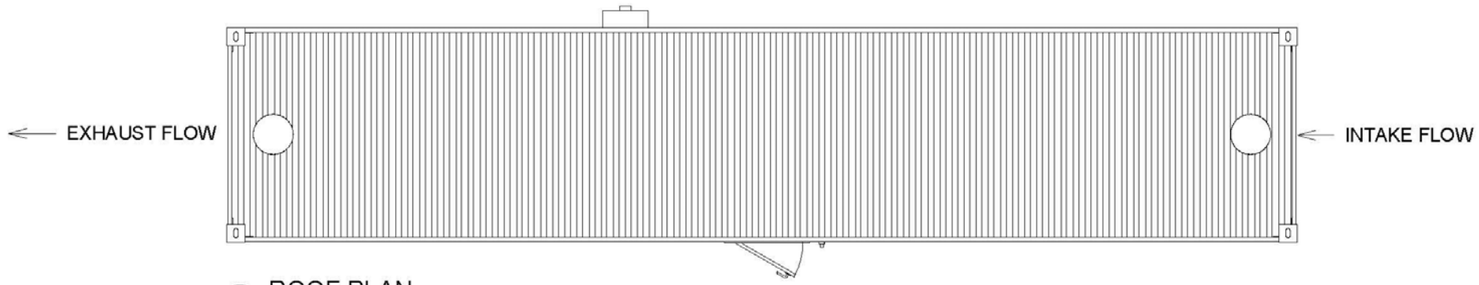
C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' X 40'

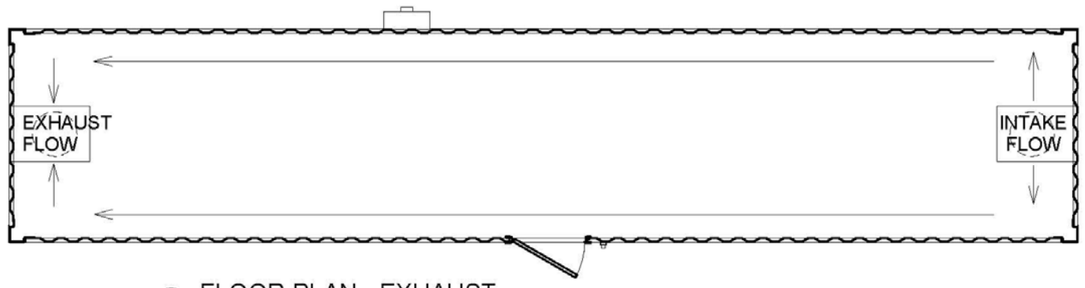
FLOOR PLAN

4

12/21/18



1 ROOF PLAN
3/16" = 1'-0"



2 FLOOR PLAN - EXHAUST
3/16" = 1'-0"

C1D1 LABS

SHIPPING CONTAINER
EXTRACTION BOOTH 8' X 40'

AIR FLOW DIAGRAM

12/21/18

5

Findings

A Finding is defined as anything that could adversely affect safety as related to products, persons or property; or impact the usability of the product. Any unresolved Findings described in this report will need to be resolved either through testing (by others) or replacement of affected components (by others) for the equipment to be considered safe for use.

1. None.

Observations

An Observation is defined as a recommendation for process or design improvements, but does not adversely affect safety of the system. Any unresolved Observations described in this report will not need to be resolved for the equipment to be considered safe for use.

1. The airflow switch enclosure is not rated for a classified electrical environment.

LP-Gas Requirements at Installation Summary

Prior to commencing LP-Gas extraction operations, these installation requirements must be met by the owner.

LPG Extraction Modular Laboratory General Requirements

- The path of egress travel to exits and within exits shall be marked by readily visible exit signs to clearly indicate the direction of egress travel in cases where the exit or the path of egress travel is not immediately visible to the occupants.
- Force required to open egress doors is not to exceed allowable limits as required by NFPA 101 Section 7.2.1.4.
- An approved eyewash station shall be installed in the LP-Gas modular laboratory.
- Penetrations into the LP-Gas modular laboratory shall be sealed vapor tight.

LPG Extraction Modular Laboratory Signage Requirements

- All applicable Safety Data Sheets (SDS) shall be posted in the LP-Gas modular laboratory.
- The appropriate NFPA 704 Hazard Rating diamond sign shall be posted on the exterior of the building and the door to the modular laboratory.
- No smoking signs shall be posted on the exterior of the building and the door to the modular laboratory.
- Applicable hazard warning signage shall be posted throughout the facility as applicable for emergency equipment (e.g. emergency eyewash, fire extinguisher, hydrocarbon monitor warning alarms, etc.).
- Signage indicating “NON-ODORIZED LIQUEFIED PETROLEUM GAS” are provided on all containers using non-odorized LPG

LPG Storage and Handling Requirements

- Storage of flammable liquids is prohibited within the designated LP-Gas modular laboratory.
- LPG containers not in use shall not be stored within the modular laboratory.

LPG Extraction Modular Laboratory Electrical Requirements

- A Class I Division 2 boundary shall be determined by the facility engineer of record.
- All metal objects including ductwork, hand sinks, water piping, etc. shall be grounded / bonded in accordance with the NFPA 70. The extraction equipment is required to be grounded/bonded.
- LP-Gas modular laboratory lighting, if installed, shall be provided with an automatic emergency power system. (Where NFPA 1 is enforced)

LPG Modular Laboratory Gas Monitor Requirements

- An appropriate portable LP-Gas monitoring device rated for a Class I Division 1 environment shall be provided for the operators.
- Gas detection system shall be provided with constant non-interlocked power. (Where NFPA 1 is enforced)
- An automatic emergency power system shall be provided for the LP-Gas modular laboratory Gas detection system. (Where NFPA 1 is enforced)

LPG Modular Laboratory Suppression Requirements

- Automatic fire suppression shall be installed within the modular laboratory.
- At least one (1) 4-A:40-B:C fire extinguisher shall be located within 30 feet of the extraction area in accordance with IFC/AFC/CFC/NYUC/OFC/WFC Tables 906.3 (1) and (2).

LPG Modular Laboratory Hazardous Exhaust System Requirements

- The exhaust fans must be relocated to the end of the duct run (indoors) and the interconnecting ductwork must be installed in compliance with CMC or IMC.
- Capture velocity shall be verified at installation. (best industry practice is approximately 100 linear feet per minute)
- Hazardous exhaust ductwork 10-inch diameter or greater shall be equipped with fire suppression as required by IMC or CMC. Site specific requirements shall be determined by the facility engineer of record.
- The expelled exhaust air outlet shall be separated from operable doors, windows, LP Gas storage, and ventilation air inlets by a minimum of 10 feet.
- All electrical components within the LP-Gas extraction room shall be interlocked such that the exhaust system shall be in operation for lighting and components to be used. (Where NFPA 1 is enforced)
- An automatic emergency power system shall be provided for the LP-Gas modular laboratory ventilation system. (Where NFPA 1 is enforced)

Ethanol Requirements at Installation Summary

Prior to commencing ethanol post-extraction operations, these installation requirements must be met by the owner.

Ethanol Post Extraction Processing Modular Laboratory General Requirements

- The path of egress travel to exits and within exits shall be marked by readily visible (illuminated) exit signs to clearly indicate the direction of egress travel in cases where the exit or the path of egress travel is not immediately visible to the occupants.
- Force required to open egress doors is not to exceed allowable limits as required by NFPA 101 Section 7.2.1.4.
- An approved eyewash station shall be installed in the post extraction processing modular laboratory.

Ethanol Post Extraction Processing Modular Laboratory Signage Requirements

- All applicable Safety Data Sheets (SDS) shall be posted in the Ethanol post extraction processing modular laboratory.
- The appropriate NFPA 704 Hazard Rating diamond sign shall be posted on the exterior of the building and the door to the modular laboratory.
- No smoking signs shall be posted on the exterior of the building and the door to the modular laboratory.
- Applicable hazard warning signage shall be posted throughout the facility as applicable for emergency equipment (e.g. emergency eyewash, fire extinguisher, hydrocarbon monitor warning alarms, etc.).

Ethanol Post Extraction Processing Electrical Requirements

- All metal objects including ductwork, hand sinks, water piping, etc. shall be grounded / bonded in accordance with the NFPA 70. The post extraction processing equipment is required to be grounded/bonded.

Ethanol Post Extraction Processing Modular Laboratory Gas Monitor Requirements

- A certificate of calibration from the manufacturer showing that the flammable vapor detection system instrument is properly calibrated to alarm when vapor concentrations of ethanol exceed 25% of the LFL/LEL shall be provided.

Ethanol Post Extraction Processing Modular Laboratory Suppression System Requirements

- Automatic fire suppression shall be installed within the modular laboratory.

- At least one (1) 4-A:40-B:C fire extinguishers shall be located within 30 feet of the extraction area in accordance with IFC/AFC/CFC/NYUC/OFC/WFC Tables 906.3 (1) and (2).

Ethanol Post Extraction Processing Modular Laboratory Hazardous Exhaust System Requirements

- The exhaust fans must be relocated to the end of the duct run (indoors) and the interconnecting ductwork must be installed in compliance with CMC or IMC.
- Capture velocity shall be verified at installation. (best industry practice is approximately 100 linear feet per minute)
- Hazardous exhaust ductwork 10-inch diameter or greater shall be equipped with fire suppression as required by IMC or CMC. Site specific requirements shall be determined by the facility engineer of record.
- The expelled exhaust air outlet shall be separated from operable doors, windows, LP Gas storage, and ventilation air inlets by a minimum of 10 feet.
- Ducts conveying explosive or flammable vapors, fumes, or dusts shall terminate not less than 30 feet from a property line. If the facility engineer of record provides documentation that the potentially flammable vapors are sufficiently diluted below a flammable concentration, this requirement may be waived.

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