FIRE CODES AND INFORMATION FOR DISTILLERIES

- TOM REINHARDT

CODES

- INTERNATIONAL FIRE CODE
- INTERNATIONAL BUILDING CODE
- REFERENCED NFPA STANDARDS:
- 13 INSTALLATION OF SPRINKLERS.
- 30 FLAMMABLE AND COMBUSTIBLE LIQUIDS.
- 61 PREVENTION OF FIRES AND DUST EXPLOSIONS.
- 69 EXPLOSION PREVENTION SYSTEMS.
- 70 NATIONAL ELECTRICAL CODE.
- 72 NATIONAL FIRE ALARM CODE.
- 77 STATIC ELECTRICITY.
- 704 IDENTIFICATION OF HAZARDOUS MATERIAL FOR EMERGENCY RESPONSE.

- DEFINITIONS

Flash Point: The minimum temperature in degrees Fahrenheit at which a liquid will give off sufficient vapors to form an ignitable mixture with air near the surface or in container the temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure at will not sustain combustion.

Flash Point

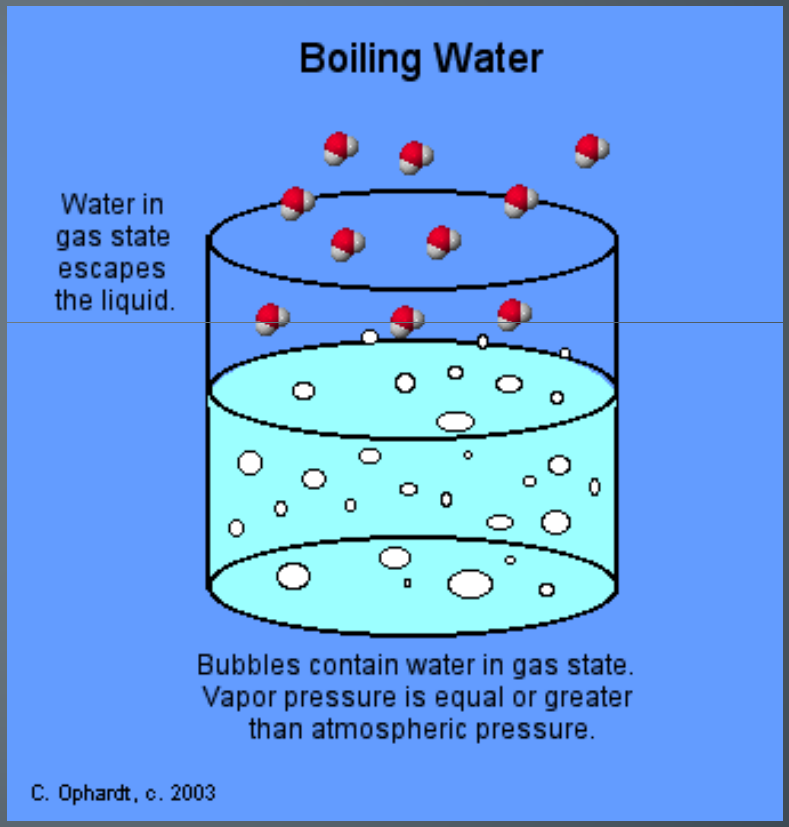
Flash point is the minimum temperature at which a liquid gives off enough vapor to form an ignitable mixture.

In general, the lower the flash point, the greater the hazard.

Flammable liquids have flash points below 100°F, and are more dangerous than combustible liquids, since they may be ignited at room temperature.

Combustible liquids have flash points at or above 100°F.

Boiling Point: The temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure.



Fire Point: The lowest temperature at which a liquid will ignite and achieve sustained burning when exposed to a test flame.

Fire point temperature is usually 8 to 10 percent higher than the flash point.

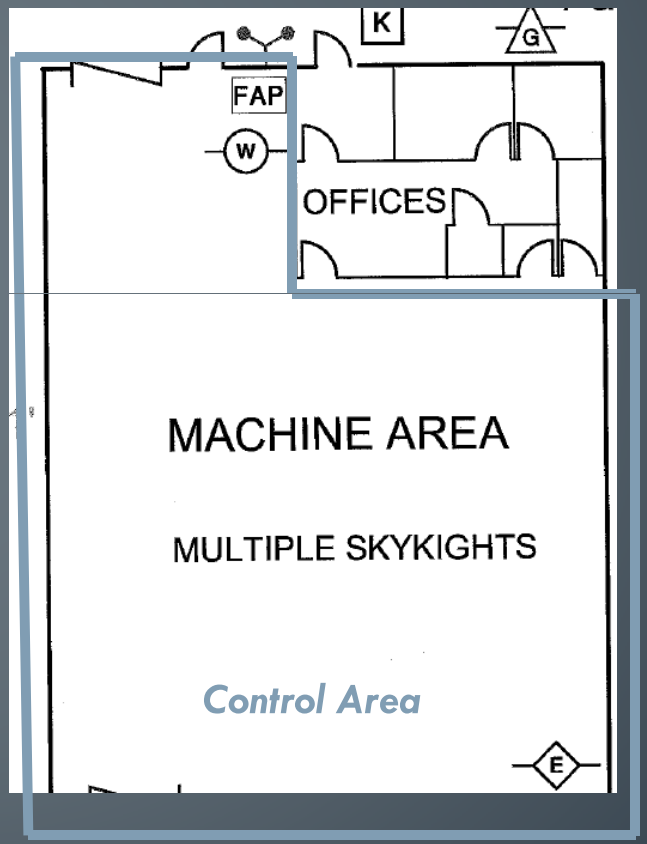
CLASSES OF FLAMMABLE LIQUIDS

- FLAMMABLE LIQUIDS
- CLASS 1A LIQUIDS HAVING A FLASHPOINT BELOW 73 DEGREES AND HAVING BOILING POINT BELOW 100 DEGREES.
- CLASS1B LIQUIDS HAVING A FLASH POINT BELOW 73 DEGREES AND A BOILING POINT AT OR ABOVE 100 DEGREES.
- CLASS 1C LIQUIDS HAVING A FLASHPOINT AT OR ABOVE 73 DEGREES AND BELOW 100 DEGREES.

CLASSES OF FLAMMABLE LIQUIDS

- COMBUSTIBLE LIQUIDS
- CLASS 2 LIQUIDS HAVING A CLOSED CUP FLASHPOINT AT OR ABOVE 100 DEGREES.
- CLASS 3A LIQUIDS HAVING A CLOSED CUP FLASH POINT AT OR ABOVE 140 DEGREES AND BELOW 200 DEGREES.
- CLASS 3B LIQUIDS HAVING A CLOSED CUP FLASHPOINTS AT OR ABOVE 200 DEGREES.

Control Area: Spaces within a building where quantities of hazardous materials not exceeding the maximum allowable quantities per control area are stored, dispensed, used or handled.



DISTILLATION

- **Distillation** is a process of separating the component substances from a liquid mixture by selective evaporation and condensation. Distillation may result in essentially complete separation (nearly pure components), or it may be a partial separation that increases the concentration of selected components of the mixture. In either case the process exploits differences in the volatility of mixture's components. In industrial chemistry, distillation is a unit operation of practically universal importance, but it is a physical separation process and not a chemical reaction.

MAQ

TABLE 9.6.1 *MAQ of Flammable and Combustible Liquids per Control Area*

	Liquid Class(es)	Quantity		Notes
		gal	L	
Flammable liquids	IA	30	115	1, 2
	IB and IC	120	460	1, 2
	IA, IB, IC combined	120	460	1, 2, 3
Combustible liquids	II	120	460	1, 2
	IIIA	330	1,265	1, 2
	IIIB	13,200	50,600	1, 4

(Source: Table 34.1.3.1 of NFPA 5000, 2006 edition.)

Notes:

(1) Quantities are permitted to be increased 100 percent where stored in approved flammable liquids storage cabinets or in safety cans in accordance with the fire code. Where Note 2 also applies, the increase for both notes is permitted to be applied accumulatively.

(2) Quantities are permitted to be increased 100 percent in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. Where Note 1 also applies, the increase for both notes is permitted to be applied accumulatively.

(3) Containing not more than the maximum allowable quantity per control area of Class IA, Class IB, or Class IC flammable liquids, individually.

(4) Quantities are not limited in a building equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*

ALCOHOL(ETHANOL)

- ETHANOL IS THE PRINCIPAL TYPE OF ALCOHOL FOUND IN ALCOHOLIC BEVERAGES. This is produced by the fermentation of sugars by yeast.
- It is a volatile, flammable, colorless liquid.
- Flash point:62 degrees F
- Autoignition temperature 685 degrees F
- NFPA RATING IS A 3 FOR FLAMMABILITY
- BOILING POINT 162 DEGREES F

The Nature of the Beast

- ***Flash Point*** – the temperature at which a flammable liquid gives off enough vapors to burn in the presence of an ignition source.

  @ 95% = 63°f

  @ 70% = 70°f

  @ 50% = 75°f

  @ 20% = 97°f

  (gasoline = minus 40°f; #2 diesel = 120°f)

- Alcohol <20% is not considered flammable

BASED ON NFPA DEFINITIONS, MOST ALCOHOL BEVERAGES ARE A IB OR IC RATED FLAMMABLE LIQUIDS

The Nature of the Beast

- Vapor Density – 1.6 (air = 1)
  - By comparison, gasoline – 3.0 - 4.0
- Specific gravity – 0.8 (water = 1)
  - By comparison, gasoline – 0.8
- Miscibility – 100%
  - By comparison, gasoline – 0%

Alcohol in a Fire

- Clean, smokeless flame; may be invisible
  - C_2H_5OH (vs. C_8H_{18} – gasoline)
- Flammable Range – 3.3% - 19.0%
  - By comparison, gasoline – 1.4% - 7.6%
- Heat of Combustion
  - 100% - 12,800 btu/lb.
  - 40% - 4,269 btu/lb.
  - By comparison, gasoline – 20,750 btu/lb.

Alcohol in a Fire

- Alcohol – complete solubility in water (blended or from fire suppression water)
- Water reduces concentration; alcohol burning out of mixture also reduces concentration
- Alcohol/water mixture (<20%) becomes non-flammable
- Gasoline – insoluble; floats on the water, continues to burn

Key Provisions for Distilleries

- General Requirements
  - Administration, fire safety, fire protection systems, exits, electrical systems
- Quantity Limits – (from NFPA 30)
  - Requirements when quantity limits are met
- Hazardous Materials Regulations
  - Additional requirements when quantity limits are exceeded
- Storage Requirements

TYPICAL FIRE SUPPRESSION SYSTEMS

- Sprinkler system – water application
  - Alcohol <20% is not considered flammable
  - Water application formula

    $\frac{\%\ alcohol}{20\%}$

    95% alcohol = 3.75X; 40% alcohol = 1X

- Dry chemical fire extinguisher
  - Interruption of chemical oxidation process

KEY PROVISIONS FOR DISTILLERIES

- GENERAL REQUIREMENTS
- ADMINISTRATION, FIRE SAFETY, FIRE PROTECTION SYSTEMS, EXITS, ELECTRICAL SYSTEMS.
- QUANTITY LIMITS-(FROM NFPA 30)
- REQUIREMENTS WHEN QUANTITY LIMITS ARE MET.
- HAZARDOUS MATERIALS REGULATIONS
- ADDITIONAL REQUIREMENTS WHEN QUANTITY LIMITS ARE EXCEEDED.
- STORAGE REQUIREMENTS

Key Provisions for Distilleries

- General Requirements
  - Administration, fire safety, fire protection systems, exits, electrical systems
- Quantity Limits – (from NFPA 30)
  - Requirements when quantity limits are met
- Hazardous Materials Regulations
  - Additional requirements when quantity limits are exceeded
- Storage Requirements

- · Distillery Operations Code Compliance
- · Hazardous Materials and Flammable Combustible Liquids & Vapors Associated with Use & Handling, as well as Heated Processes Associated with Distillation Systems
- · High Hazard H-Occupancy & Special Uses
- · Lower Flammable Limit Exhaust Evaluation
- · Storage Options and Exemptions Associated with Finished Goods, Wood Barrels and Steel Barrels.
- · Analysis and Options for Vapor Explosion Control & Mitigation
- · Fire Sprinkler Design and Hazardous Materials Storage Options
- · Fire & Building Code Compliance Analysis and Reports
- · Hazardous Material & Chemical Classification & Inventory Reporting for Hazardous Materials Inventory

ETHANOL CLASSIFIED AS A 1B FLAMMABLE LIQUID

- FLASH POINT OF 62 DEGREES FARENHEIT
- BOILING POINT IS 162 DEGREES FARENHEIT

CAN SOMEBODY PLEASE TELL ME WHAT IS THE OCCUPANCY FOR A DISTILLERY?

- THAT DEPENDS

LETS START WITH THE INTERNATIONAL BUILDING CODE

CHAPTER 3. USE AND OCCUPANCY CLASSIFICATION SECTION 306.2 STATES THAT: BEVERAGES OVER 16 PERCENT ALCOHOL CONTENT IS A MODERATE-HAZARD GROUP F-1

WHAT IS THE MAQ FOR A 1B FLAMMABLE LIQUID?

- 1. ALWAYS START WITH THE IFC CODES
- 2. CHAPTER 57 FLAMMABLE AND COMBUSTIBLE LIQUIDS
- 3. CHAPTER 50 HAZARDOUS MATERIALS
- 4. CHAPTER 50 TABLE 5003.1.1(1)

WHAT ABOUT THE AMOUNT OF FLAMMABLE LIQUIDS.

- LET'S GO TO THE INTERNATIONAL FIRE CODE CHAPTER CHAPTER 57 WHICH EVENTUALLY TELLS US HOW MUCH ETHANOL(1B) WE CAN HAVE FOR MAXIMUM QUANTITY. CHAPTER 57 STATES THAT FOR AN F-1 YOU MUST REFER TO THE IFC CHAPTER 50 HAZARDOUS MATERIALS TABLE 5003.1.1(1)

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	Not Applicable	H-2	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable
Combustible fiber	Loose Baled[o]	H-3	(100) (1,000)	Not Applicable	Not Applicable	(100) (1,000)	Not Applicable	Not Applicable	(20) (200)	Not Applicable
Combustible liquid[c,j]	II IIIA IIIB	H-2 or H-3 H-2 or H-3 Not Applicable	Not Applicable	120[d,e] 330[d,e] 13,200[e,f]	Not Applicable	Not Applicable	120[d] 330[d] 13,200[f]	Not Applicable	Not Applicable	30[d] 80[d] 3,300[f]
Cryogenic Flammable	Not Applicable	H-2	Not Applicable	45[d]	Not Applicable	Not Applicable	45[d]	Not Applicable	Not Applicable	10[d]
Consumer fireworks	1.4G	H-3	125[d,e,l]	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Cryogenic Oxidizing	Not Applicable	H-3	Not Applicable	45[d]	Not Applicable	Not Applicable	45[d]	Not Applicable	Not Applicable	10[d]
Explosives	Division 1.1 Division 1.2 Division 1.3 Division 1.4 Division 1.4G Division 1.5 Division 1.6	H-1 H-1 H-1 or H-2 H-3 H-3 H-1 H-1	1[e,g] 1[e,g] 5[e,g] 50[e,g] 125[d,e,l] 1[e,g] 1[e,g]	(1)[e,g] (1)[e,g] (5)[e,g] (50)[e,g] Not Applicable (1)[e,g] Not Applicable	Not Applicable	0.25[g] 0.25[g] 1[g] 50[g] Not Applicable 0.25[g] Not Applicable	(0.25)[g] (0.25)[g] (1)[g] (50)[g] Not Applicable (0.25)[g] Not Applicable	Not Applicable	0.25[g] 0.25[g] 1[g] Not Applicable Not Applicable 0.25[g] Not Applicable	(0.25)[g] (0.25)[g] (1)[g] Not Applicable Not Applicable (0.25)[g] Not Applicable
Flammable gas	Gaseous Liquefied	H-2	Not Applicable	Not Applicable (150)[d,e]	1,000[d,e] Not Applicable	Not Applicable	Not Applicable (150)[d,e]	1,000[d,e] Not Applicable	Not Applicable	Not Applicable
Flammable liquid[c]	IA IB and IC	H-2 or H-3	Not Applicable	30[d,e] 120[d,e]	Not Applicable	Not Applicable	30[d] 120[d]	Not Applicable	Not Applicable	10[d] 30[d]
Flammable liquid, combination (IA, IB, IC)	Not Applicable	H-2 or H-3	Not Applicable	120[d,e,h]	Not Applicable	Not Applicable	120[d,h]	Not Applicable	Not Applicable	30[d,h]
Flammable solid	Not Applicable	H-3	125[d,e]	Not Applicable	Not Applicable	125[d]	Not Applicable	Not Applicable	25[d]	Not Applicable

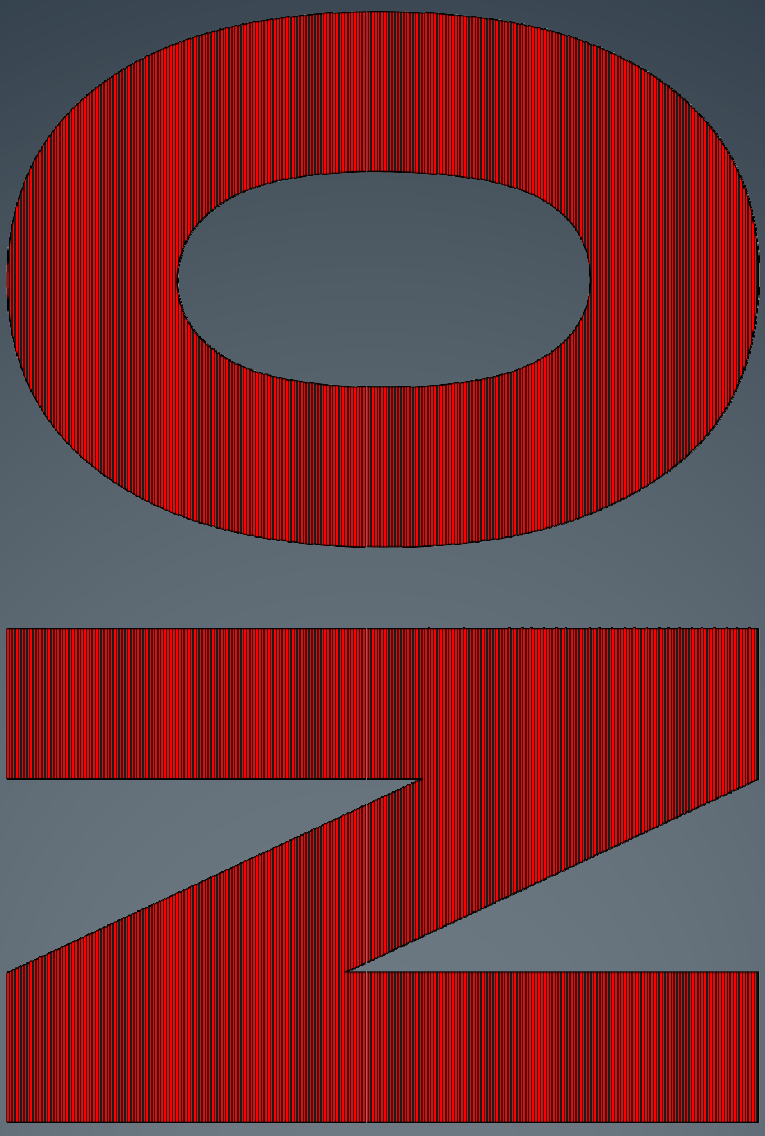
TABLE 5003.1.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, i, m, n, p]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	Not Applicable	H-2	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable
Combustible fiber	Loose Baled[o]	H-3	(100) (1,000)	Not Applicable	Not Applicable	(100) (1,000)	Not Applicable	Not Applicable	(20) (200)	Not Applicable
Combustible liquid[c,j]	II IIIA IIIB	H-2 or H-3 H-2 or H-3 Not Applicable	Not Applicable	120[d,e] 330[d,e] 13,200[e,f]	Not Applicable	Not Applicable	120[d] 330[d] 13,200[f]	Not Applicable	Not Applicable	30[d] 80[d] 3,300[f]
Cryogenic Flammable	Not Applicable	H-2	Not Applicable	45[d]	Not Applicable	Not Applicable	45[d]	Not Applicable	Not Applicable	10[d]
Consumer fireworks	1.4G	H-3	125[d,e,l]	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Cryogenic Oxidizing	Not Applicable	H-3	Not Applicable	45[d]	Not Applicable	Not Applicable	45[d]	Not Applicable	Not Applicable	10[d]
Explosives	Division 1.1 Division 1.2 Division 1.3 Division 1.4 Division 1.4G Division 1.5 Division 1.6	H-1 H-1 H-1 or H-2 H-3 H-3 H-1 H-1	1[e,g] 1[e,g] 5[e,g] 50[e,g] 125[d,e,l] 1[e,g] 1[e,g]	(1)[e,g] (1)[e,g] (5)[e,g] (50)[e,g] Not Applicable (1)[e,g] Not Applicable	Not Applicable	0.25[g] 0.25[g] 1[g] 50[g] Not Applicable 0.25[g] Not Applicable	(0.25)[g] (0.25)[g] (1)[g] (50)[g] Not Applicable (0.25)[g] Not Applicable	Not Applicable	0.25[g] 0.25[g] 1[g] Not Applicable Not Applicable 0.25[g] Not Applicable	(0.25)[g] (0.25)[g] (1)[g] Not Applicable Not Applicable (0.25)[g] Not Applicable
Flammable gas	Gaseous Liquefied	H-2	Not Applicable	Not Applicable (150)[d,e]	1,000[d,e] Not Applicable	Not Applicable	Not Applicable (150)[d,e]	1,000[d,e] Not Applicable	Not Applicable	Not Applicable
Flammable liquid[c]	IA IB and IC	H-2 or H-3	Not Applicable	30[d,e] 120[d,e]	Not Applicable	Not Applicable	30[d] 120[d]	Not Applicable	Not Applicable	10[d] 30[d]
Flammable liquid, combination (IA, IB, IC)	Not Applicable	H-2 or H-3	Not Applicable	120[d,e,h]	Not Applicable	Not Applicable	120[d,h]	Not Applicable	Not Applicable	30[d,h]
Flammable solid	Not Applicable	H-3	125[d,e]	Not Applicable	Not Applicable	125[d]	Not Applicable	Not Applicable	25[d]	Not Applicable

- SO IN AN F-1 OCCUPANCY YOU CAN ONLY HAVE 240 GALLONS OF A 1B IF THE BUILDING IS SPRINKLERED. AFTER 240 GALLONS YOU GO INTO A H-2.

WHAT ABOUT EXCEPTIONS(NONAPPLICABILITY) FOUND IN THE IFC FLAMMABLE AND COMBUSTIBLE LIQUID CODE CHAPTER 57 SECTION 5701.2

- NUMBER 10. THE STORAGE OF DISTILLED SPIRITS AND WINE IN WOODEN BARRELS OR CASKS.
- DOES THIS MEAN THAT THESE ALCOHOLIC BEVERAGES WILL NEVER BE TREATED AS HAZARDOUS MATERIALS?
- DOES ONLY NFPA 13 (SPRINKLERS) AND IFC CHAPTER 32(HIGH PILE COMBUSTIBLE STORAGE) APPLY?
- CAN I STORE THOUSANDS OF GALLLONS OF ALCOHOL WITHOUT A PROBLEM?



REMEMBER THE BUILDING CODE HAS THE SAME MAQ REQUIREMENTS AS THE IFC; HOWEVER THE BUILDING CODE HAS NO EXCEPTIONS FOR ALCOHOL BEVERAGES,SO THE MAQs DO APPLY.

WHEN THE MAQ IS EXCEEDED IT MAKE IT A H OCCUPANCY.THIS RESTRICT ALLOWABLE AREA,MANDATES SPRINKLER PROTECTION, AND SEPERATION FACTORS.

ALSO THE BUREAU OF ALCOHOL,TOBACCO,FIREARMS AND EXPLOSIVES AND THE FOOD AND DRUG ADMINISTRATION HAVE REGULATIONS.

When Quantity Limits Are Exceeded

- Spill Control
- Secondary containment
- Ventilation
- Automatic sprinkler system
- Explosion control (open use, dispensing of Class 1B > MAQ)
- Supervision
- Standby or emergency power
- Limit controls (level, temperature, pressure)
- Manual emergency alarm
- Clearance from combustibles (outdoor storage area)
- Noncombustible floor
- Weather protection

SPILL CONTROL

- IFC CHAPTER,SECTION 5703.4 STATES THAT IF YOU EXCEED THE MAQ YOU MUST HAVE SPILL, AND SECONDARY CONTAINMENT IN ACCORDANCE WITH IFC SECTION 5004.2.

- 5004.2 STATES:

  - 1. LIQUID TIGHT SLOPED OR RECESSED FLOORS IN INDOOR LOCATIONS.

  - 2 LIQUID TIGHT FLOORS IN INDOOR LOCATIONS PROVIDED WITH LIQUID TIGHT RAISED OR RECESSED SILLS OR DIKES.

  - 3. SUMPS AND COLLECTION SYSTEMS.

  - 4. OTHER APPROVED ENGINEERED SYSTEMS

  - SECONDARY CONTAINMENT IS REQUIRED.

VENTILATION

- IFC CHAPTER 50, SECTION 5005.2.1.1 STATES THAT: “WHERE GASES, LIQUIDS, OR SOLIDS HAVING A HAZARD RANKING OF 3 OR 4 IN ACCORDANCE WITH NFPA 704 ARE DISPENSED OR USED, MECHANICAL EXHAUST VENTILATION SHALL BE PROVIDED.”

H-2

IN THE IFC AND THE IBC SECTION 907.2.5 INDICATES THAT AN AUTOMATIC FIRE DETECTION SYSTEM IS NOT REQUIRED.

H-2

IFC AND THE IBC SECTION 903.2.5.1 REQUIRES ALL GROUP H TO HAVE AUTOMATIC SPRINKLER SYSTEMS.

EXPLOSION CONTROL

- IFC CHAPTER 9 SECTION 911 LEADS YOU TO TABLE 911.1. THIS STATES WHEN DEALING WITH A 1B FLAMMABLE YOU NEED EXPLOXION CONTROL REQUIREMENTS. THIS REFERENCES NFPA 69 EXPLOSION PREVENTION SYSTEMS.

STANDBY AND EMERGENCY POWER SYSTEMS

- IFC CHAPTER 50 SECTION 5004.7, STATES: “WHERE MECHANICAL VENTILATION SYSTEMS ARE REQUIRED THEN YOU MUST HAVE AN EMERGENCY POWER SYSTEM. THIS SYSTEM MUST BE INSTALLED PER NFPA 70, AND NFPA 110 (EMERGENCY AND STANDBY POWER SYSTEMS.”

HIGH-HAZARD GROUP H-2(IBC 2012 EDITION)

- SECTION 307.4 H-2 SHALL INCLUDE:

- CLASS 1,2 AND 3A FLAMMABLE OR COMBUSTIBLE LIQUIDS WHICH ARE USED OR STORED IN NORMALLY OPEN CONTAINERS OR SYSTEMS, OR IN CLOSED CONTAINERS OR SYSTEMS PRESSURIZED AT MORE THAN 15 PSI.

WHAT DOES A BUILDING NEED TO BE H-2 COMPLIANT?

- **Types of Construction/IBC**
- **Types I & II** - Building Elements are of noncombustible materials.
- **Type III** - Exterior walls are of noncombustible materials and the interior
- building elements are of any material permitted by the code.
- **Type IV** - H. T. (Heavy Timber) - Exterior walls are of noncombustible
- materials and the interior building elements are of solid or
- laminated wood without concealed spaces.
- **Type V** - Structural elements, exterior and interior walls are of any
- materials permitted by the code.
- A. Fire-resistance rated construction.
- B. Non fire-resistance rated construc

SECTION 503 GENERAL BUILDING HEIGHT AND AREA LIMITATIONS

TABLE 503 ALLOWABLE BUILDING HEIGHTS AND AREAS[a, b] Building height limitations shown in feet above grade plane. Story limitations shown as stories above grade plane. Building area limitations shown in square feet, as determined by the definition of "Area, building," per story

SECTION 503 GENERAL BUILDING HEIGHT AND AREA LIMITATIONS

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SECTION 503 GENERAL BUILDING HEIGHT AND AREA LIMITATIONS

GROUP		TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	HEIGHT (feet)	UL	160	65	55	65	55	65	50	40
		STORIES(S) AREA (A)								
A-1	S	UL	5	3	2	3	2	3	2	1
	A	UL	UL	15,500	8,500	14,000	8,500	15,000	11,500	5,500
H-2	S	UL	3	2	1	2	1	2	1	1
	A	21,000	16,500	11,000	7,000	9,500	7,000	10,500	7,500	3,000
H-3	S	UL	6	4	2	4	2	4	2	1
	A	UL	60,000	26,500	14,000	17,500	13,000	25,500	10,000	5,000
H-4	S	UL	7	5	3	5	3	5	3	2
	A	UL	UL	37,500	17,500	28,500	17,500	36,000	18,000	6,500

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.
A = building area per story, S = stories above grade plane, UL = Unlimited, NP = Not permitted.
a. See the following sections for general exceptions to Table 503:
1. Section 504.2, Allowable building height and story increase due to automatic sprinkler system installation.
2. Section 506.2, Allowable building area increase due to street frontage.
3. Section 506.3, Allowable building area increase due to automatic sprinkler system installation.
4. Section 507, Unlimited area buildings.
b. See Chapter 4 for specific exceptions to the allowable height and areas in Chapter 5.

TABLE 508.4 REQUIRED SEPARATION OF OCCUPANCIES (HOURS)

OCCUPANCY	A, E		I-1, I-3, I-4		I-2		R[a]		F-2, S-2[b], U		B, F-1, M, S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1, I-3, I-4	—	—	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	—	—	—	—	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R[a]	—	—	—	—	—	—	N	N	1[c]	2[c]	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2[b], U	—	—	—	—	—	—	—	—	N	N	1	2	NP	NP	3	4	2	3	2	NP
B, F-1, M, S-1	—	—	—	—	—	—	—	—	—	—	N	N	NP	NP	2	3	1	2	1	NP
H-1	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	NP	NP	NP	NP	NP	NP
H-2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	1	NP	1	NP
H-3, H-4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1[d]	NP	1	NP
H-5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP

TABLE 508.4 REQUIRED SEPARATION OF OCCUPANCIES (HOURS)

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
N = No separation requirement.
NP = Not permitted.
a. See Section 420.
b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but to not less than 1 hour.
c. See Section 406.3.4.
d. Separation is not required between occupancies of the same classification.

H-2

SECTION 907.2 OF THE IFC AND IBC DOES REQUIRE A MINIMUM OF ONE FIRE ALARM BOX IN AN APPROVED LOCATION.

IBC SECTION 414.1.3

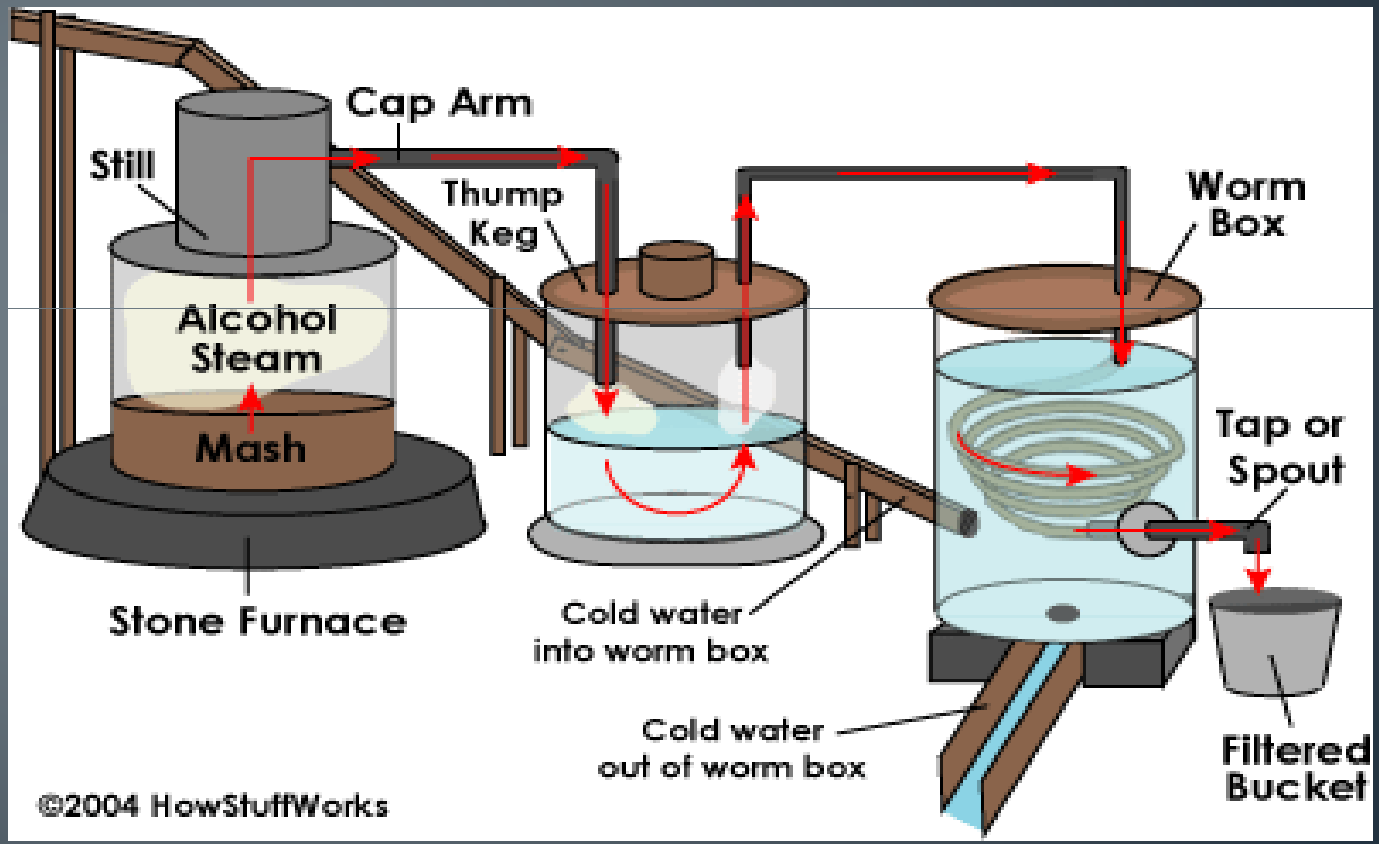
INFORMATION REQUIRED:

A REPORT MUST BE SUBMITTED TO THE BUILDING OFFICIAL OF THE MAXIMUM EXPECTED QUANTITIES OF HAZARDOUS MATERIALS. THE METHOD OF PROTECTION FROM SUCH HAZARDS INCLUDING BUT NOT LIMITED TO CONTROL AREAS, FIRE PROTECTION SYSTEMS. FOR BUILDINGS AND STRUCTURES WITH AN OCCUPANCY IN GROUP H, SEPARATE FLOOR PLANS SHALL BE SUBMITTED IDENTIFYING THE LOCATIONS OF ANTICIPATED CONTENTS AND PROCESS SO AS TO REFLECT THE NATURE OF EACH OCCUPIED PORTION OF EVERY BUILDING AND STRUCTURE.

WHAT DOES ALL THIS MEAN?

- THE SHORT ANSWER IS, THE CODE GIVES YOU THE RIGHT AS A FIRE OFFICIAL TO REQUEST TECHNICAL HELP ON ALL ISSUES, WITHOUT CHARGE TO THE JURISDICTION.

BASICS OF DISTILLATION



GRAIN HANDLING

- GRAINS INCLUDING, (INCLUDING CORN, RYE, AND BARLEY ARE RECEIVED IN BUL STORAGE. THE GRAINS ARE THEN MILLED.

MASHING

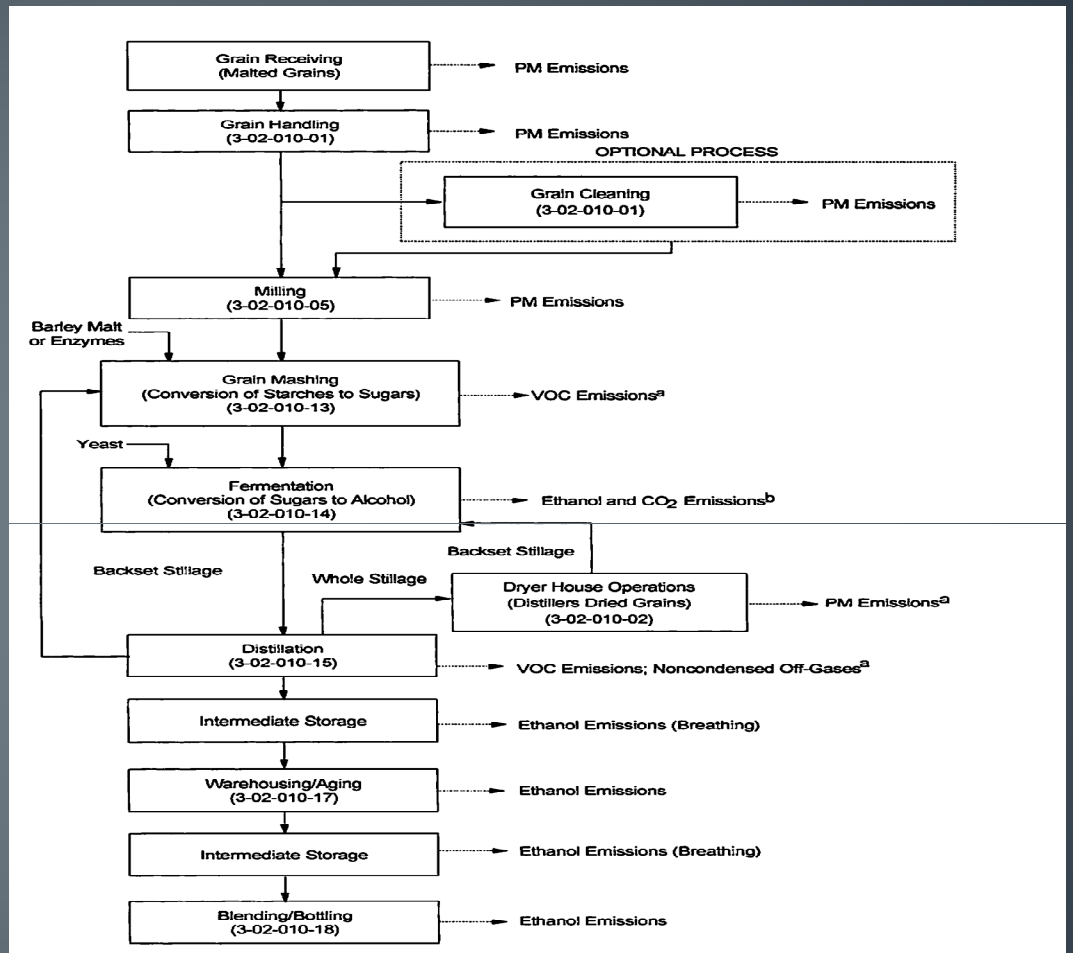
- THE GRAINS ARE MIXED WITH WATER AND COOKED IN MASH TUBS OR COOKERS TO CONVERT THE STARCHES TO SUGARS IN A PROCESS REFERRED TO AS MASHING.

FERMENTATION

- YEAST IS ADDED TO THE MASH AND THE SOLUTION IS FERMENTED TO CONVERT SUGAR TO ETHYL ALCOHOL.

DISTILLATION

- THE FERMENTED LIQUID IS DISTILLED TO SEPARATE THE ALCOHOL FROM THE MASH. The liquid is heated to generate vapors. Vapors condensed to form liquid.



es require heat. Emissions generated (e.g., CO, CO_2, NO_x, SO_2, PM, and VOCs) will depend on the source of fuel.
mpounds can be generated in trace quantities during fermentation including ethyl acetate, fusel oil, furfural,
hyde, sulfur dioxide, and hydrogen sulfide. Acetaldehyde is a hazardous air pollutant (HAP).

CORN


Nutrena
COUNTRY FEEDS
Whole Corn
Energy source for multiple species of livestock
Carefully cleaned to help minimize foreign material and dust

CORN

BARLEY

BARLEY

RYE

RYE

MILL ROLLER

AUGER TUBE

AUGER INTO MASH COOKER

MASH COOKER

550 GALLON MASH COOKER

TOP OF MASH COOKER

BOTTOM OF MASH COOKER

BOILER

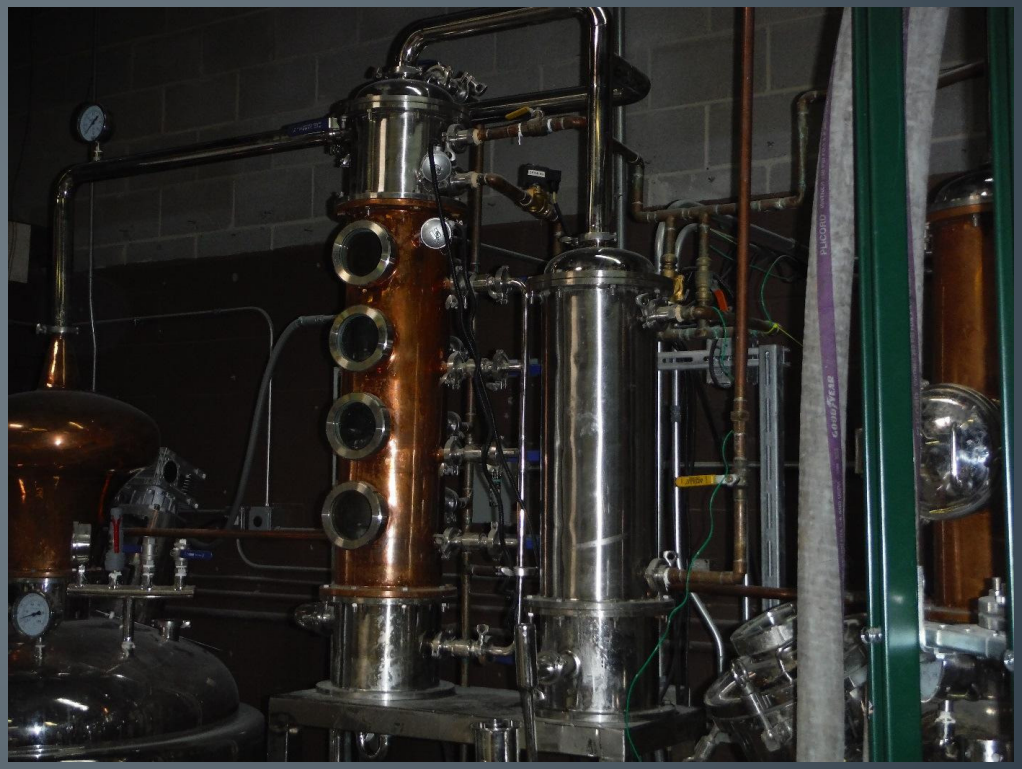
GAS SHUT OFF FOR BOILER

AIR DIAPHRAGM PUMP

FERMENTER 1100 GALLONS (3-5 DAYS)

STILL POT

DISTILLATION COLUMN



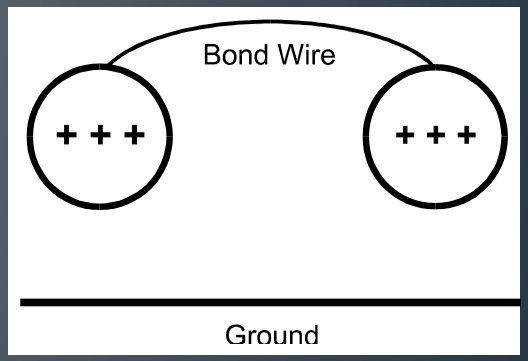
PUMPING TO BARRELS

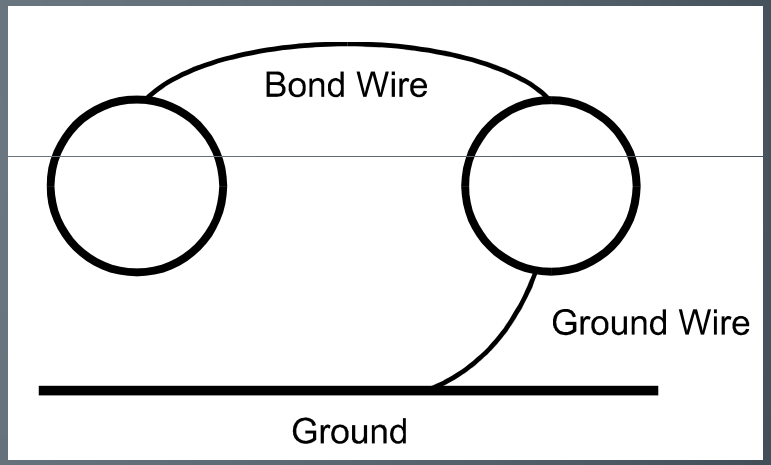
BARRELS

NFPA 77 "Recommended Practice on Static Electricity"

Bonding: is a process by two or more conductive objects are connected by means of a conductor so that they are at the same electrical potential. The voltage difference between the objects is zero.

- Physically connect two conductive objects together with a bond wire to eliminate a difference in static charge potential between them
- Must provide a bond wire between containers during flammable liquid filling operations, unless a metallic path between them is otherwise present

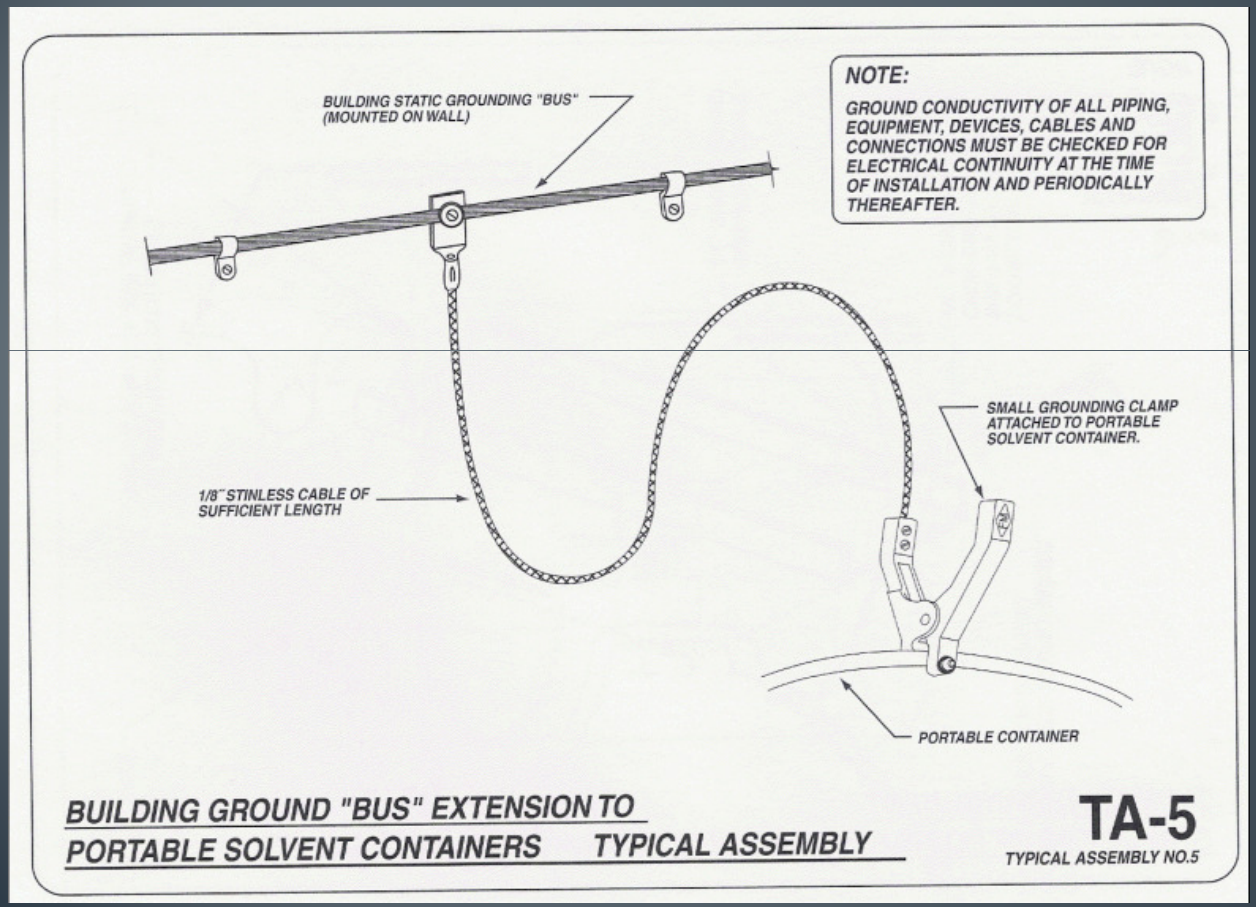


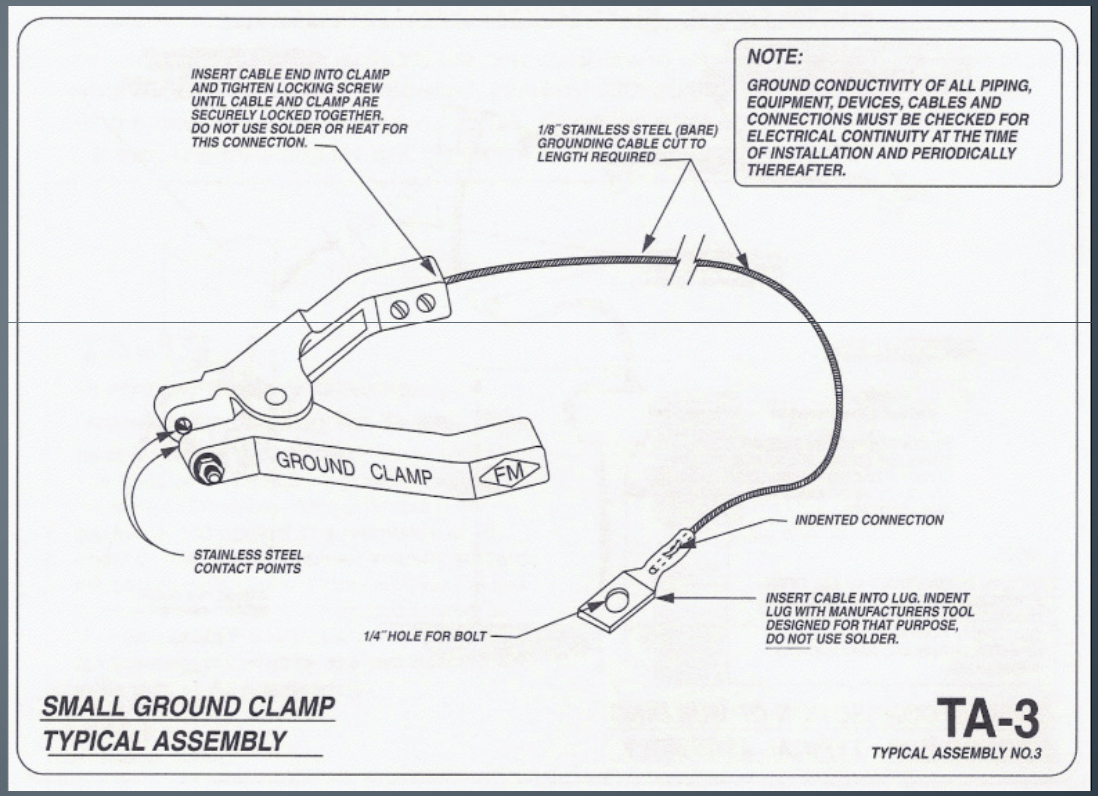

Bond Wire
Ground Wire
Ground

Grounding resistance requirements – NFPA 77, Section 7.4.1.3

To prevent the accumulation of static electricity in conductive equipment, there should be low resistance on the ground path.

A resistance of 1 megohm (A million OHMS) or less is generally is considered adequate. A licensed electrician should check ground and show you documentation.


BUILDING STATIC GROUNDING "BUS"
(MOUNTED ON WALL)
NOTE:
GROUND CONDUCTIVITY OF ALL PIPING, EQUIPMENT, DEVICES, CABLES AND CONNECTIONS MUST BE CHECKED FOR ELECTRICAL CONTINUITY AT THE TIME OF INSTALLATION AND PERIODICALLY THEREAFTER.
SMALL GROUNDING CLAMP ATTACHED TO PORTABLE SOLVENT CONTAINER.
1/8" STINLESS CABLE OF SUFFICIENT LENGTH
PORTABLE CONTAINER
BUILDING GROUND "BUS" EXTENSION TO PORTABLE SOLVENT CONTAINERS TYPICAL ASSEMBLY
TA-5
TYPICAL ASSEMBLY NO.5


NOTE:
GROUND CONDUCTIVITY OF ALL PIPING, EQUIPMENT, DEVICES, CABLES AND CONNECTIONS MUST BE CHECKED FOR ELECTRICAL CONTINUITY AT THE TIME OF INSTALLATION AND PERIODICALLY THEREAFTER.
INSERT CABLE END INTO CLAMP AND TIGHTEN LOCKING SCREW UNTIL CABLE AND CLAMP ARE SECURELY LOCKED TOGETHER. DO NOT USE SOLDER OR HEAT FOR THIS CONNECTION.
1/8" STAINLESS STEEL (BARE) GROUNDING CABLE CUT TO LENGTH REQUIRED
GROUND CLAMP
FM
INDENTED CONNECTION
STAINLESS STEEL CONTACT POINTS
INSERT CABLE INTO LUG. INDENT LUG WITH MANUFACTURERS TOOL DESIGNED FOR THAT PURPOSE, DO NOT USE SOLDER.
1/4" HOLE FOR BOLT
SMALL GROUND CLAMP
TYPICAL ASSEMBLY
TA-3
TYPICAL ASSEMBLY NO.3

KNOWING ALL THE REQUIREMENTS FOR AN H-2 IS GREAT, BUT LET US LOOK AT IFC SECTION 104.7.2.TECHNICAL ASSISTANCE:

TO DETERMINE THE ACCEPTABILITY OF TECHNOLOGIES, PROCESS, PRODUCTS, FACILITIES, MATERIAL AND USES ATTENDING THE DESIGN, OPERATION OR USE OF A BUILDING PREMISE SUBJECT TO INSPECTION BY THE FIRE CODE OFFICIAL, THE FIRE CODE OFFICIAL IS AUTHORIZED TO REQUIRE THE OWNER TO PROVIDE, A TECHNICAL OPINION AND REPORT. THIS REPORT MUST BE PREPARED BY A FIRE SAFETY ORGANIZATION ACCEPTABLE TO THE FIRE CODE OFFICIAL. THE FIRE CODE OFFICIAL IS AUTHORIZED TO REQUIRE DESIGN SUBMITTALS TO BE PREPARED BY, AND BEAR THE STAMP OF, A REGISTERED DESIGN PROFFESSIONAL.

IFC SECTION 106.2

THE FIRE CODE OFFICIAL IS AUTHORIZED TO ENGAGE SUCH EXPERT OPINION AS DEEMED NECESSARY TO REPORT UPON UNUSUAL, DETAILED OR COMPLEX TECHNICAL ISSUES SUBJECT TO THE APPROVAL OF THE GOVERNING BODY.

VILLAGE OF
WHEELING
ILLINOIS

August 15, 2012

Attention: Jeff Walsh
Windy City Distilling
P.O. Box 518
Deerfield, IL 60015

Subject: Extent of fire prevention and control of proposed distillery at Windy City Distilling located at 140 Shepard Avenue, Wheeling, IL

Dear Mr. Walsh:

The Wheeling Fire Prevention Bureau has determined that an engineering evaluation shall be conducted regarding the operation and application of sound fire protection and process engineering principles. This evaluation shall include, but not be limited to, the following:

1. Analysis of the fire and explosion hazards of the operation.
2. Analysis of applicable requirements for liquid handling, transfer, and use.
3. Analysis of local conditions, such as exposures to and from adjacent properties.
4. Analysis of building criteria for operation of a distillery.

This evaluation can be conducted by an Illinois licensed fire engineer.

Should you have any questions or require any further information, please do not hesitate to contact me.

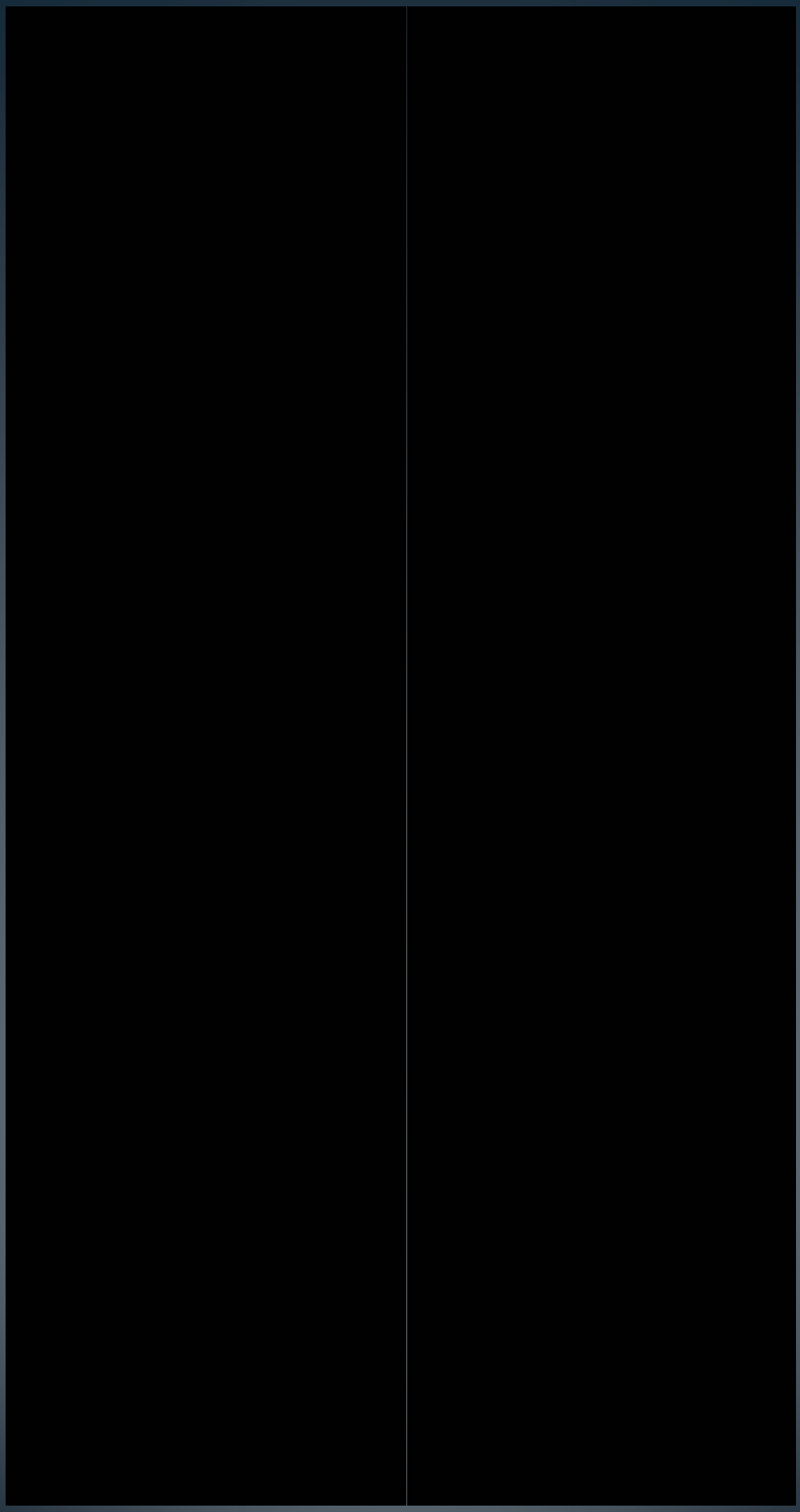
Sincerely,

WHEELING FIRE PREVENTION BUREAU

Tom Reinhardt
Wheeling Fire Inspector

2 Community Boulevard
Wheeling, IL 60090

phone: 847.459.2600 • fax: 847.459.9692
www.wheelingil.gov



THE END