Brewery and Distillery – Occupancy Classifications and Requirements

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What are we going to cover?

- What exactly are they doing in all those tanks?
- How do I classify this?
- What are some requirements that would apply?
- Could there be something different about this brewery that may have a special requirement?
LET'S LOOK AT BREWERIES FIRST
UNDERSTANDING A BREWERY
Typical Brewing Process
The Process:

- Malting – barley, wheat, soaked in a tank until sprouting, then kiln dried.
  - Possible Hazards – Kiln, installed per manufacturer’s specifications.
  - Ventilation per NC Mechanical Code.

- Mashing/Lautering – dry malt is crushed into grist. Placed in large drum with heated water and mashed into a substance that is then strained to remove the pulp, leaving wort.
  - Hazards – the crushing process may produce combustible dust, depending upon how this is accomplished. Typically in a closed container and the water will absorb the dust.
The Process, continued:

- Boiling and Whirl pooling – wort is placed in kettle and boiled, hops are added to the process, beginning and end. Whirl pooling removes sludge.
  - Possible Hazards – process used in boiling the wort, possibly steam, must evenly heat the ‘kettle’.
  - Boiler, separation and inspection if above 15 psi and larger than 5 cubic feet.
  - Ventilation per NC Mechanical Code.

- Cooling and Fermentation – Wort is cooled and then sent to a fermentation tank where yeast is added. Yeast is removed, possibly reused.

- Bright Beet Tank – This is where beer is filtered and CO2 is added/adjusted for packaging.
  - Possible Hazards – CO2 leakage.
Just incase the other picture was not clear.
HOW DO I CLASSIFY THIS OCCUPANCY?
Red Oak Brewery, Burlington, NC
What would a brewery be classified as?

- A brewery is manufacturing, processing and packaging a product which would fall under the Group F, Factory, Occupancy:

- 306.1 Factory Industrial Group F. Factory Industrial Group F occupancy includes, among others, the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or Group S storage occupancy.
What would a brewery be classified as?

- F-1 or F-2 – Let’s look at what is being manufactured, processed and packaged.
  - Beer, typically under 9% alcohol by volume.
  - NC Law limits ABV% in malted beverages to 15%.
  - F-2 – Beverages up to 16% alcohol content, 306.2 NCBC.
What would a brewery be classified as?

- F-1 or F-2 – Let’s look at what is being manufactured, processed and packaged.
  - Can they brew higher ABV% and sell out of state?
    - Above 15% ABV the brew would no longer considered a malt beverage. It would be, per the definitions, a fortified wine or spirituous liquor, making the operation a distillery / winery not a brewery in NC.
Aviator Brewery, Fuquay-Varina, NC
What about everyone’s favorite activity? Tasting the product.

- Some breweries may have:
  - Tasting rooms
  - Tap rooms
  - Bar
  - Restaurant
  - Entertainment areas

- Some may offer tasting tours in the brewery.
What about everyone’s favorite activity? Tasting the product.

- What occupancy classification involves drinks, and possibly food:

  - A-2 Assembly uses intended for food and/or drink consumption including, but not limited to:
    - Banquet halls
    - Night clubs
    - Restaurants
    - Taverns and bars
We have F-2 and A-2, what now?
Separation?

- A-2 from F-2, if required, NCBC Table 508.4:
  - 1 hour - not sprinkler protected
  - None if sprinkler protected

- Incidental use:
  - Boiler, Table 508.2.5 NCBC.
Separation?

- Other factors:
  - Building construction type and size, Table 503.
  - Calculated occupant load of A-2 area, Section 903.3.2.1.2.
    - Is it a Night Club?
      - Over 100 occupant load, and
      - More than 10% A-2 area for dancing, and
      - Allows alcoholic beverage consumption (Duh! It’s a brewery)
Night Club: New and Improved Definition

- Night Club. An A-2 occupancy meeting all of the following conditions:
  - The aggregate floor area of concentrated use and standing space that is used for dancing and/or viewing of performers exceeds 10 percent of the Group A-2 fire area, excluding adjacent lobby areas; and
  - Provides live or recorded entertainment by performing artist; and
  - Allows alcoholic beverage consumption
Hazards

- What are some hazards associated with breweries?
  - Making Malt
  - Boiling the Wort
  - Fermentation
  - Packaging
  - Storage
  - Hazardous Materials
Hazards: Malt (Combustible Dust)

- Making malt, depending on the process, could create combustible dust.

- Where do we look for guidance?
  - Chapter 13 of the North Carolina Fire Code.
  - NC Mechanical Code.
Hazards: Malt (Combustible Dust)

- Section 511 of the NC Mechanical Code
  - Localized ventilation/exhaust and make up air.
    - Mill
    - Furnace
  - Chapter 10
Hazards: Heating Process

- Process may require a large boiler or large industrial kettle.
  - Incidental use separation
- For Boiler:
  - Chapter 10 of the NC Mechanical Code
  - 1 hour separation; or
  - Sprinkler protection
  - Discharge piping, Section 511 of the NC Mechanical Code.
- Localized exhaust / ventilation and make up air.
Anchor Brewing, Kettle
Hazards: Fermentation

- Yeast added to the wort starts the fermentation process
  - Fermentation is where the yeast breaks down sugars to form alcohol and carbon dioxide.
  - Ethyl alcohol (Ethanol) 0-5% flash point over 145°F / 62.8°C
  - Ethyl alcohol (Ethanol) 5-10% flash point over 120°F / 48.9°C
  - Ethyl alcohol (Ethanol) 10-16% flash point over 100°F / 48.9°C
BEER

HAZARD WARNING:
DANGER: MAY BECOME IRRITABLE & PERVERSE. DO NOT ATTEMPT TO DRIVE OR OPERATE HEAVY MACHINERY.

TARGET ORGANS
BLADDER
STOMACH
BRAIN
KIDNEYS

HEALTH HAZARD 4
1. UNCONSCIOUS
2. OBNOXIOUS
3. GIDDY
4. A LITTLE TIPSY
5. SOBER

FIRE HAZARD 4
1. EXPLOSIVE FLATULENCE
2. SMOKING LARGE CIGAR
3. CHAIN SMOKING
4. DOES NOT INHALE
5. WILL NOT BURN

REACTIVITY 4
1. READY TO TAKE ON MIKE TYSON
2. EASILY PROVOKED
3. GETTING BRAVE
4. MILD MANNERED
5. STABLE

SPECIFIC HAZARD H
L. COULD LEAD TO SHOTS OF LIQUEUR
C. COULD TURN A 3 INTO A 10
H. HANGOVER LIKELY

PERSONAL PROTECTIVE EQUIPMENT REQUIRED

PORCELAIN THRONE
GAS RESPIRATOR
ASPIRIN
BUCKET
DESIGNATED DRIVER
SLEEP

DANGER
HAS BEEN KNOWN TO CAUSE IRRATIONAL BEHAVIOR IN LABORATORY RATS
Hazards: Fermentation

- Now we have this information how do we classify it?
- COMBUSTIBLE LIQUID. A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:
  - Class II. Liquids having a closed cup flash point at or above 100°F (38°C) and below 140°F (60°C).
    - Between 5% and 16% ABV
  - Class IIIA. Liquids having a closed cup flash point at or above 140°F (60°C) and below 200°F (93°C).
    - Between ≈3.5% and 5% ABV
  - Class IIIB. Liquids having a closed cup flash points at or above 200°F (93°C).
    - Below ≈3.5% ABV
Hazards: Cooling

- Cooling may involve Glycol:
Hazards: Cooling

- Propylene Glycol
  - Food grade refrigerant
  - Class III-B flammable liquid, same as product
  - Non-Fire Prevention Code regulated health hazards:
    - Irritant
  - Ventilation per Table 403.3 of the NC Mechanical Code.
    - May be localized / designed exhaust
Hazards: Packaging

- Packaging may involve CO2
  - Recently the IFC has recognized the hazards involved with CO2 in closed spaces.
  
  - CO2 alarm requirements have been proposed to the 2018 North Carolina Fire Code.
  
  - Ventilation per Table 403.3 of the NC Mechanical Code.
    - May be localized / designed exhaust
Anchor Brewing, storage
Hazards: Storage

- Packaging
  - Bottles
  - Kegs

- Beer would be a Class I commodity, per Section 2303.2 of the NCFC and NFPA.

- Height

- Storage heights exceeding 12 feet, requirements for Class I Commodities per Chapter 23.
QUESTIONS ABOUT BREWERIES?
NOW ON TO DISTILLARIES
What exactly are they doing in all those tanks?

How do I classify this?

What are some requirements that would apply?

Could there be something different about this brewery that may have a special requirement?
UNDERSTANDING A DISTILLERY
A DOUBLE DISTILLATION TECHNIQUE FOR RUM

- **WASH 8-10% ABV**
  - **STRIPPING RUN**
    - **LOW WINES ~45% ABV**
      - **SPIRIT RUN BOILER CHARGE**
        - Adjusted to ~35% ABV with dunder
        - **SPIRIT RUN**
          - **1st Fraction HEADS**
          - **2nd Fraction HEARTS**
          - **3rd Fraction TAILS**
          - **4th Fraction RUM-OILS**
      - **BACKSET / SPENT BEER**
        - **AGED DUNDER TO ACIDIFY AND ADD FLAVOUR TO WASH**
  - **DUNDER PIT**
  - **FEINTS JAR**

- **HEADS JAR**

- **RUM 70-75% ABV**
HOW DO I CLASSIFY THIS OCCUPANCY?
Southern Grace Distillery, Mt. Pleasant, NC
What would a distillery be classified as?

- A distillery, is manufacturing, processing and packaging a product which would fall under the Group F, Factory, Occupancy:

- 306.1 Factory Industrial Group F. Factory Industrial Group F occupancy includes, among others, the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or Group S storage occupancy.
What would a distillery be classified as?

- F-1 or F-2 – Let’s look at what is being manufactured, processed and packaged.
  - Sprits, typically over 20% alcohol by volume.
  - F-2 – Beverages up to 16% alcohol content, 306.2 NCBC.
  - F-1 - Beverage over 16% alcohol content.
What would a distillery be classified as?

- F-1 or F-2 – Let’s look at what is being manufactured, processed and packaged.
  - F-2 16% and Below
  - F-1 Above 16%
    - Above 15% ABV according to NC Law the product would no longer considered a malt beverage. It would be, per the definitions, a fortified wine or spirituous liquor, making the operation a distillery /winery in NC.
    - Sprits are typically above 16% alcohol.

- What if they exceed the MAQ’s? Table 2703.3.1.1 (1)
  - H-2 or H-3
  - Let’s look and see:
What would a distillery be classified as?

- [F] 307.4 High-hazard Group H-2. Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following:
  - Class I, II or IIIA 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 (103.4 kPa) gage.
  - Class I flammable liquid
  - Normal open or closed and above 15 psi
What would a distillery be classified as?

- [F] 307.5 High-hazard Group H-3. Buildings and structures containing materials that readily support combustion or that pose a physical hazard shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:
  - Class I, II or IIIA flammable or combustible liquids that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kPa) or less
  - Class I flammable liquid
  - Normally closed 15 psi or less.
What would a distillery be classified as?

- What if they exceed the MAQ’s?
  - H-2 or H-3
  - Let’s look and see:
  - Both Class I Flammable – get to that later.
    - H-2 – Normally open - stills are closed, process is closed. May be open to dispense, and open to bottle (not long)
    - H-2 – Pressurized and normally closed, above 15psi. Research has not shown a still above 15psi.
    - H-3 – Normally closed, stills are closed, process is closed.

- Depending on the total process start with H-3 and possibly move to H-2 if quite a bit of the process is open.
Broadslab Distillery, Benson, NC
What about everyone’s favorite activity? Tasting the product.

- Some distilleries may have:
  - Tasting rooms
  - Tap rooms
  - Bar
  - Restaurant
  - Entertainment areas

- Some may offer tasting tours in the brewery.
What about everyone’s favorite activity? Tasting the product.

- What occupancy classification involves drinks, and possibly food:
  - A-2 Assembly uses intended for food and/or drink consumption including, but not limited to:
    - Banquet halls
    - Night clubs
    - Restaurants
    - Taverns and bars
We have F-1 and A-2, what now?
Separation?

- A-2 from F-1, if required, NCBC Table 508.4:
  - 2 hour - not sprinkler protected
  - 1 hour - sprinkler protected

- Incidental use:
  - Boiler, Table 508.2.5 NCBC.
  - Furnace room, Table 508.2.5 NCBC.
Separation?

- Other factors:
  - Building construction type and size, Table 503.
  - Calculated occupant load of A-2 area, Section 903.3.2.1.2.
    - Is it a Night Club?
      - Over 100 occupant load, and
      - More than 10% A-2 area for dancing, and
      - Allows alcoholic beverage consumption (Duh! It’s a distillery)
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- Night Club. An A-2 occupancy meeting all of the following conditions:
  - The aggregate floor area of concentrated use and standing space that is used for dancing and/or viewing of performers exceeds 10 percent of the Group A-2 fire area, excluding adjacent lobby areas; and
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- Where do we look for guidance?
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Hazards: Malt (Combustible Dust)

- Section 511 of the NC Mechanical Code
  - Localized ventilation/exhaust and make up air.
    - Mill
    - Furnace
  - Chapter 10
  - NFPA 61 – Dust Control
Hazards: Fermentation

- Yeast added starts the fermentation process
  - Fermentation is where the yeast breaks down sugars to form alcohol and carbon dioxide.
  - Ethyl alcohol (Ethanol) 0-5% flash point over 145oF / 62.8oC
  - Ethyl alcohol (Ethanol) 5-10% flash point over 120oF / 48.9oC
  - Ethyl alcohol (Ethanol) 10-16% flash point over 100oF / 48.9oC
Hazards: Fermentation – the Mash

- How do we classify it?
- COMBUSTIBLE LIQUID. A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:
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    - Between ≈3.5% and 5% ABV
  - Class IIIB. Liquids having a closed cup flash points at or above 200°F (93°C).
    - Below ≈3.5% ABV
Hazards: Distilling Process

- Process requires a large boiler or large industrial kettle.
  - Incidental use separation
- For Boiler:
  - Chapter 10 of the NC Mechanical Code
  - 1 hour separation; or
  - Sprinkler protection
  - Discharge piping, Section 511 of the NC Mechanical Code.
- Localized exhaust / ventilation and make up air.
Hazards: Distilling Process

- Process produces distilled sprits;
  - Ethyl alcohol (Ethanol) ≈17-≈55% flash point under 100°F / 37.8°C above 73°F / 22.8°C
  - Ethyl alcohol (Ethanol) ≈55 - 100% flash point under 73°F / 22.8°C
Hazards: Distilling Process

- How do we classify it?
- FLAMMABLE LIQUID. A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:
  - Class IA. Liquids having a flash point below 73°F (23°C) and having a boiling point below 100°F (38°C).
    - Boiling point of pure Ethyl alcohol (Ethanol) is 78°C
  - Class IB. Liquids having a flash point below 73°F (23°C) and having a boiling point at or above 100°F (38°C).
    - ≈55-100% ABV or 110 – 200 proof
  - Class IC. Liquids having a flash point at or above 73°F (23°C) and below 100°F (38°C).
    - ≈17- ≈55% ABV or 34 – 109 proof
Hazards: Distilling Process

- Caution:
  - Distilling may involve open process, from the distiller/still to the container/holding tank/retention tank/cask.
  - Bottling may require some open containers/ open process as well.
  - Class IB and IC – 120 gallons storage, not in wooden barrel, cask or 1.3 gallon bottles.
  - Class IB and IC – 120 gallons closed system.
  - Class IB and IC – 30 gallons open system.
Distilling kettle
Hazards: Packaging

- Packaging may involve open system / process
  - Ventilation per Table 403.3 of the NC Mechanical Code.
    - May be localized / designed exhaust
  - 120 gallons closed process / 30 gallons open process
    - Increased 2 fold for sprinkler protection.
Hazards: Packaging

- Packaging may involve CO2
  - Recently the IFC has recognized the hazards involved with CO2 in closed spaces.
  - CO2 alarm requirements have been proposed to the 2018 North Carolina Fire Code.
  - Ventilation per Table 403.3 of the NC Mechanical Code.
    - May be localized / designed exhaust
Distillery, storage
Hazards: Storage

- Packaging
  - Bottles
  - Kegs
  - Wooden cask

- Distilled sprits would be either Class I commodity (under 20% ABV), Class II commodity (not exceeding 20% in combustible containers), Class IV commodity (20% to 80%) or High Hazard (above 80%), per Section 2303.2 of the NCFC and NFPA.

- Height

- Storage heights exceeding 12 feet, requirements appropriate class commodity per Chapter 23.
QUESTIONS ABOUT DISTILLERIES?