

- Part 3-

Brewery Safety
Bootcamp – *ONLINE!*

Heat and Pressure Hazards, Confined Spaces and
Lockout/Tagout, and Operating During Covid-19

May 15, 2020

CRAFT BREWERS CONFERENCE

& BrewExpo America[®]

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your partner in craft brewery sanitation



Matt Stinchfield

Safety Ambassador

Brewers Association

Boulder, Colorado



@MattStinchfield

#SafetyAmBadAssador

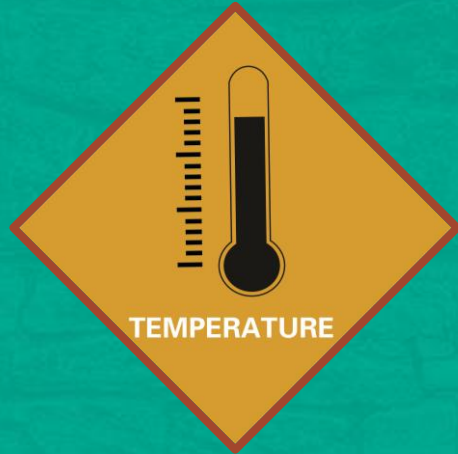


mstinchfield

UNIQUE BREWERY HAZARDS

HEAT AND PRESSURE

KETTLE BOILOVERS



KETTLE BOILOVERS

TASKS

- Wort Boiling
- Hop Addition

OUTCOMES

- Deep Tissue Burns/Fatality
- Permanent Disability
- PTSD
- Production Shutdown and Product Loss

CAUSES

- Overcharging kettle volume
- Lack of foam controls
- Rapid hop addition
- Failure to monitor temp.

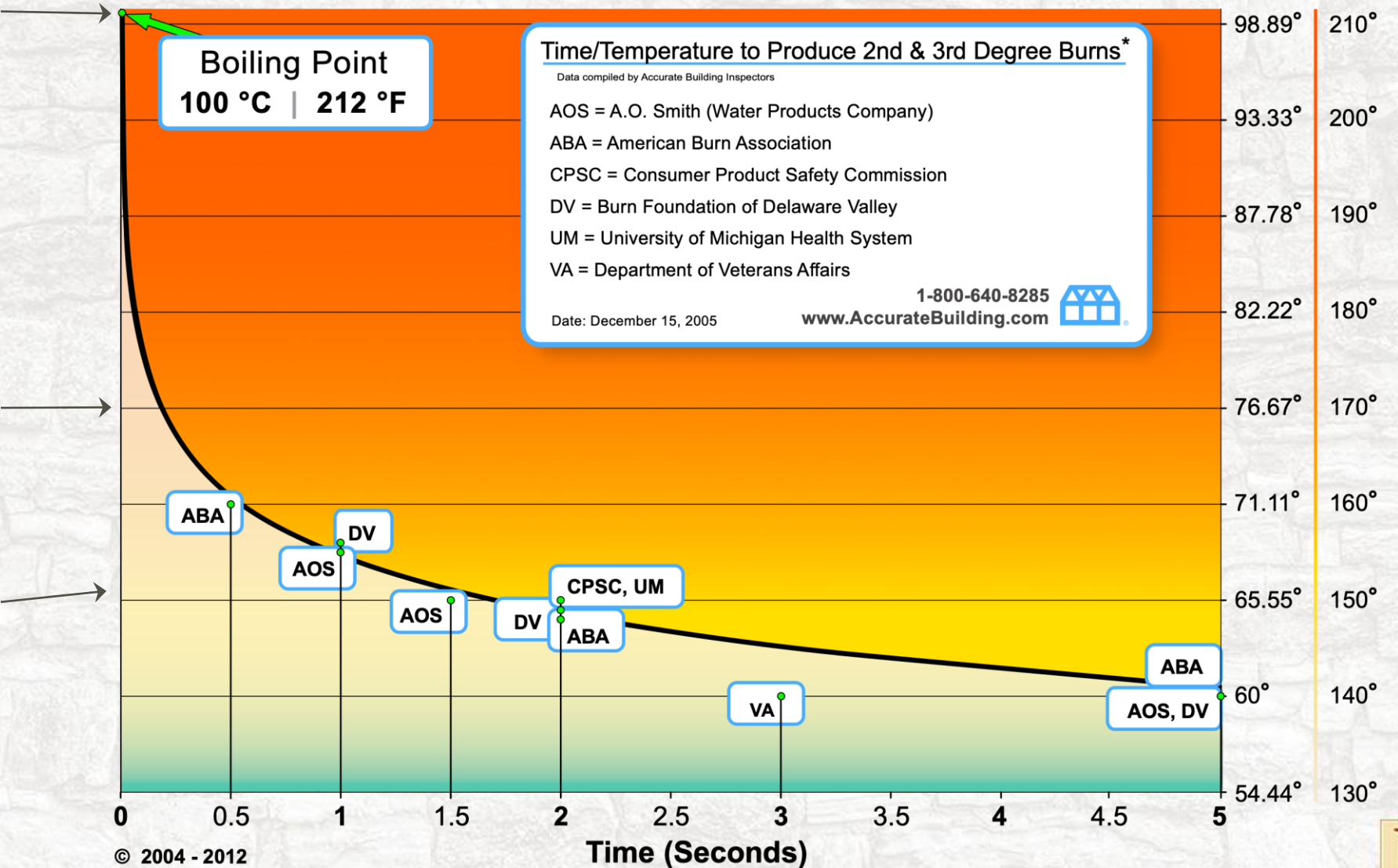
Hot Water Burn & Scalding Graph

Temperature
°Celsius / °Fahrenheit
°C °F

Boiling Wort ca. 213 °F - Instantaneous -

Caustic Cleaning 170 °F - ca. 200 ms -

Mash @ Conversion 152 °F - ca. 1.5 sec -



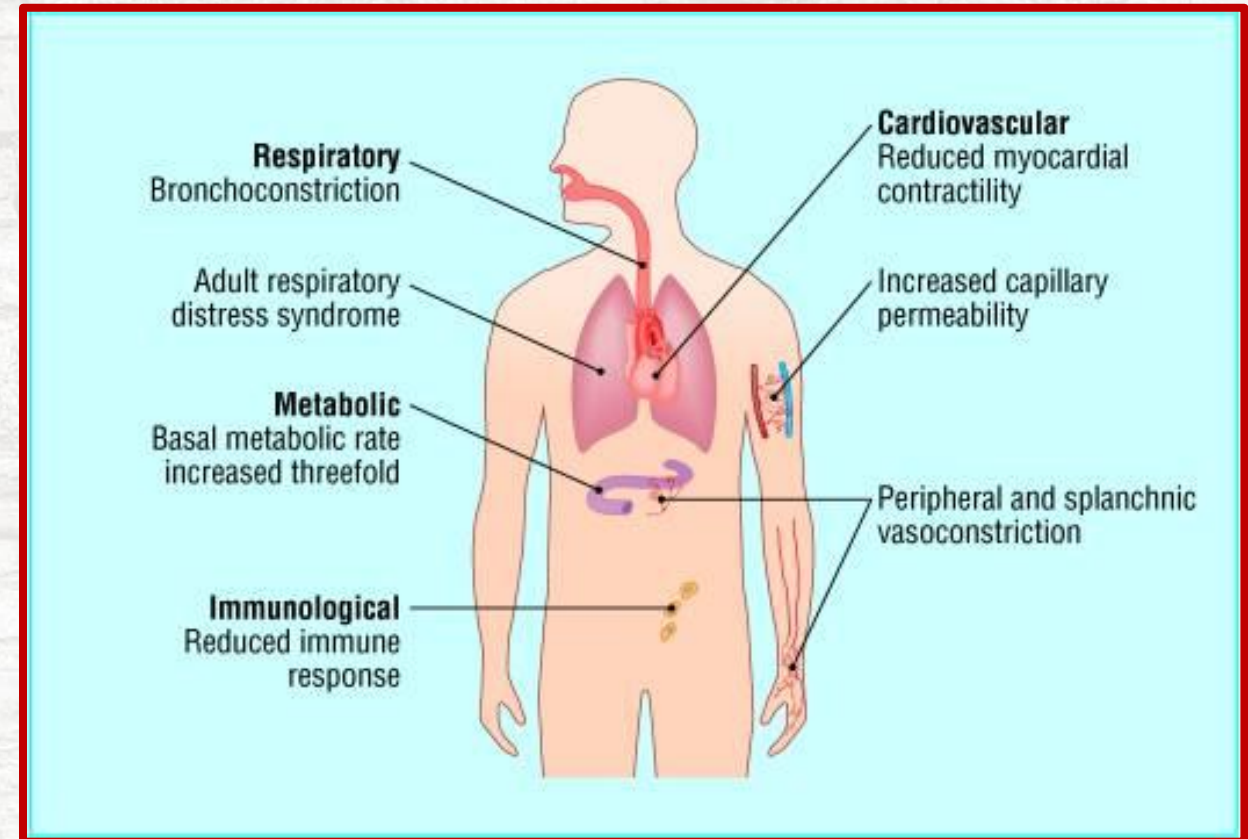
Systemic Effects Beyond the Burn Site

Body Responds to Burn by

- Releasing cytokines and other anti-inflammatory mediators

Results

- Bronchoconstriction
- Increased basal metabolic rate
- Cardiovascular issues
 - Heart contractions decreased
 - Vasoconstriction of organs
- Reduced immune response



Source: National Center for Biotechnology Information, US National Library of Medicine.

KETTLE BOILOVERS

ENGINEERING CONTROLS

- Foam shutoff switch
- Anti-foam agent
- Spray hose to cool
- Temperature sensor
- Manway positioning in regard to operator

PROCEDURAL

- Stick to design volumes: 30-50% freeboard
- Avoid “line of fire”
- Gradual hop addition, only after hot break
- Follow an SOP
- Eye protection, insulated gloves, long pants over boots



Thanks to our
generous
sponsor



Andy Clearwaters

Health and Safety Manager

Bell's Brewery

Comstock, Michigan



andy-clearwaters-3069989a

PRESSURIZED SYSTEMS



PRESSURE HAZARD ASSESSMENT

TASKS

- Moving Beer
- Keg Cleaning
- Vessel CIP
- Using Compressed Air and Gases: CO₂, N₂, O₂
 - Oxygenating
 - Carbonating
 - Packaging
- Wort Production

OUTCOMES

- Equipment Failure
 - Tank Vacuum Implosion
 - Tank Pressure Explosion
- Flying Objects
- Chemical Spray
- Asphyxiation
- Wort Burns

CONTROLS

- Use gauges
- Primary & Secondary Regulators
- Cylinder Restraint
- Pressure / Vacuum Relief Valves
- Burst Disks
- Proper Fittings

PRESSURIZED SYSTEMS

CELLAR VESSEL HAZARD CONTROLS

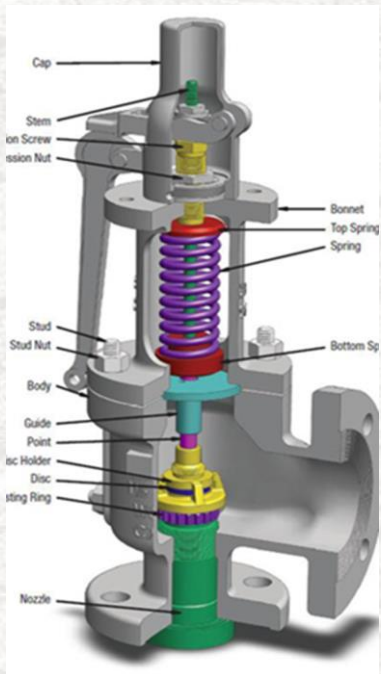
ENGINEERING CONTROLS

- Safety valve
- Pressure Relief Valve (PRV)
- Vacuum Relief Valve (VRV)
- Burst disk, or Rupture disk
- Correct sizing and pressure/vacuum settings

PROCEDURAL & SWP

- Follow an SOP
- Understand chemical and physical reasons for tank failure
- Inventory valves
- Schedule relief valve inspection and cleaning

PRESSURE RELIEF DEVICES FOR VESSELS



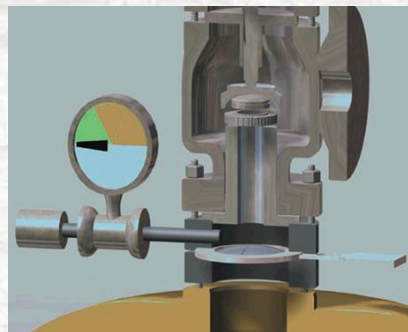
Conventional Pressure Relief Valve



Common Spring-loaded Tri-clamp Pressure Relief Valve



Rupture Disk



Pressure Relief Valve / Rupture Disk Combination



Storage Tank Relief Device (protects overpressure and vacuum)



Lever Action Pressure Relief Valve

PRESSURIZED SYSTEMS

PACKAGING AND DISPENSE HAZARD CONTROLS

ENGINEERING CONTROLS

- Secondary regulators and pressure gauges at point of equipment connection
- Safety valves
- Plexiglas panels
- Proper connections
 - Oetiker clamps
 - Factory installed hose fittings
 - DO NOT USE worm clamps

PROCEDURAL & SWP

- Follow an SOP
- Understand how to depressurize system before uncoupling
- Know correct operating pressure of all equipment
- Regularly inspect, cleaning, replace wearable parts

PRESSURE HAZARDS



DON'T BE A HOSER!

WAY TO GO!!!



NO NO NO!!!





Thanks to our
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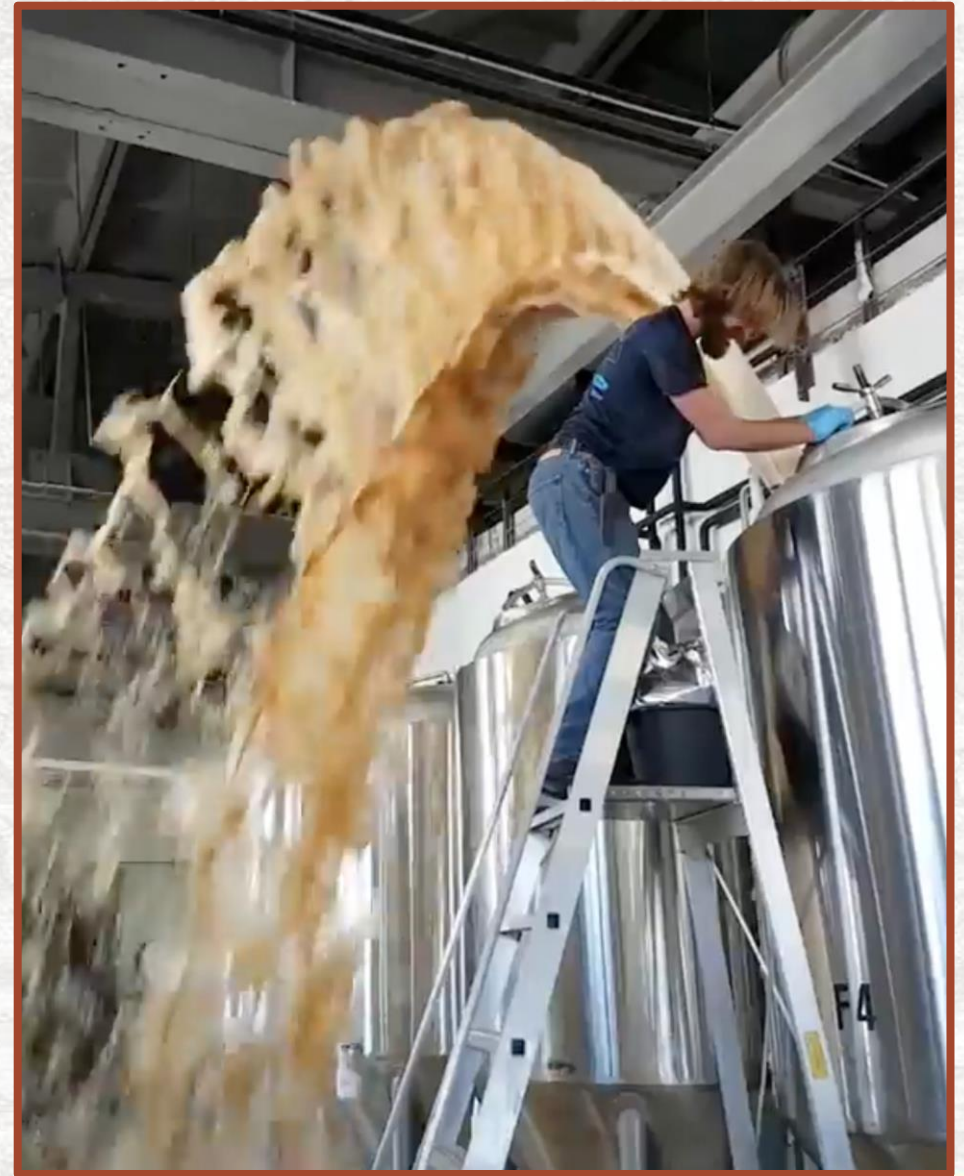
Chris Bogdanoff

Head Brewer & BA Safety Subcommittee Chair

Heroes Restaurant and Brewery

Anaheim, California

DRY HOPPING FAILS



DRY HOPPING FAILS, a.k.a. “POPCORNING” or “HOP VOLCANO”

TASKS

- Dry Hopping
- Adding Seasonings or Fruit Flavoring
- PRV Cleaning

HAZARDS

- Flying Objects due to Pressure
- CO₂ Overexposure
- Risk of Falling from Height

CONTROLS

- Engineering Controls
- Established Procedures
- Safe Work Practices
 - Working at height
- PPE
 - Fall protection

DRY HOPPING

HAZARD CONTROLS

PRESSURE HAZARDS

- Blow down CO₂ head pressure per an SOP
- Keep pressure gauges and PRVs clean, operational
- Don't exceed design volume
- Add ingredients slowly
- Consider hop doser or recirculation equip.

WORKING AT HEIGHTS

- Choose best system your resources allow
 - Scissor lift
 - Rolling platform stairs
 - Extension ladder or step ladder
- Harness, Anchor, Tether
- Catwalk

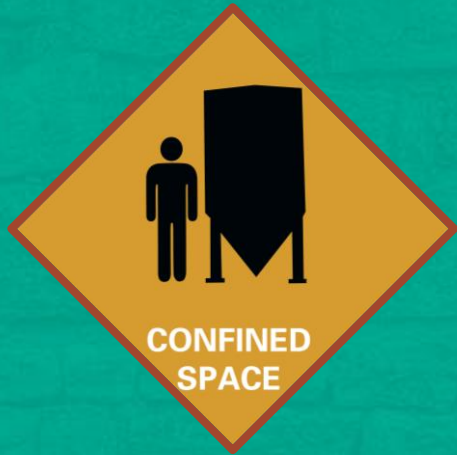


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Environmental and Safety Manager

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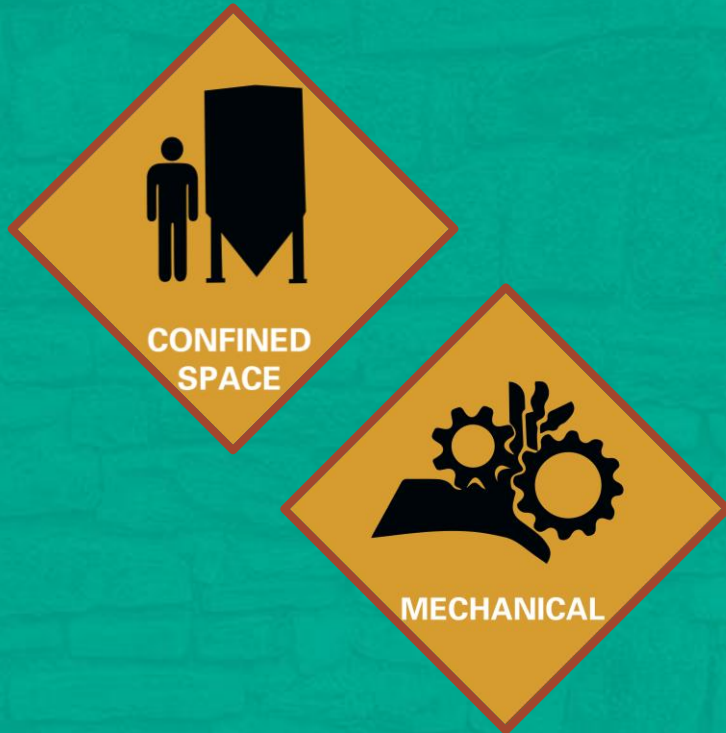


CONFINED SPACES & LOCKOUT/TAGOUT



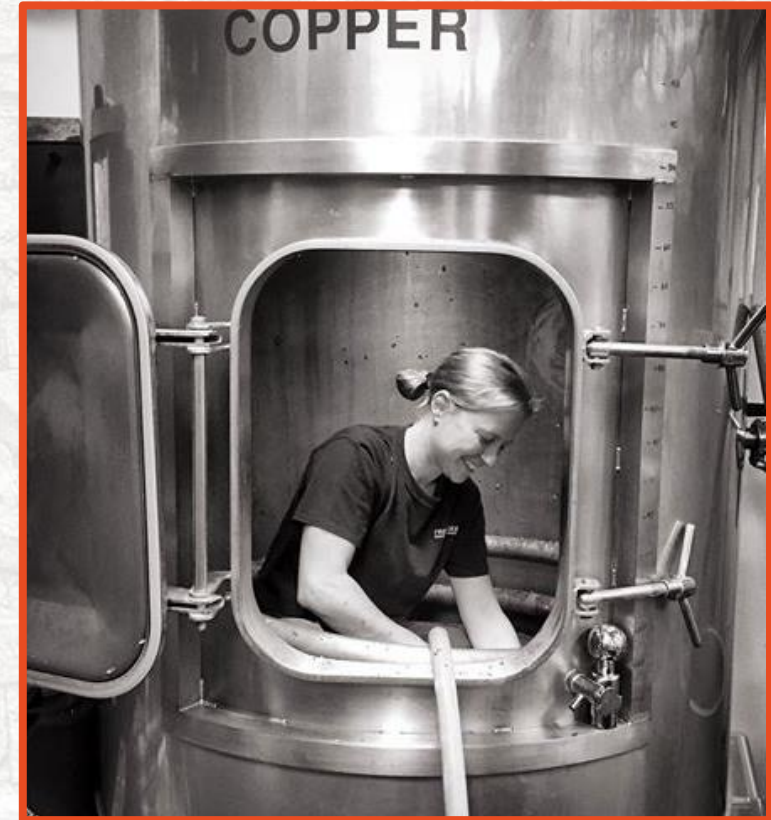
INCREASE YOUR AWARENESS &
SYSTEMATIZE YOUR PROCEDURES

CONFINED SPACES



ACCIDENTS

- **Confined space accidents are rare**
 - Often fatal
 - Often involve more than one person
- **Accidents are easily preventable**
- **Majority of deaths are would-be rescuers**



DEFINITION

CONFINED SPACE

- Large enough to bodily enter and perform work
- Limited means of entry or exit
- Not designed for continuous human occupancy

EXAMPLES

- Brewhouse Vessels
MT, LT, BK, WP, HLT,
CLT
- Fermenters
- Bright Tanks
- CIP Tanks
- Yeast Brink
- Wastewater treatment
tanks, sumps
- Grain Silos



CONFINED SPACE HAZARD ASSESSMENT

TASKS

- Brewhouse Vessel Cleaning
- FV/BBT Cleaning
- Water and Wastewater Inspection
- Grain Silo Inspection





HAZARDS

- Bad Atmosphere, e.g. O₂ Deficiency
- Mechanical Hazards
- High Temperature
- Engulfment
- Falls

CONTROLS

- Air Monitoring
- Engineering
 - LO/TO
 - Forced Air Flow
- Administrative
 - Hazard Assessment
 - Reclassification
 - SOPs & Training

PERMIT-REQUIRED CONFINED SPACE QUALIFIERS

Potential to contain hazardous atmosphere	Engulfment hazard	Converging walls or floor	Any other serious hazard
<ul style="list-style-type: none"> • O₂ def. atmos. • Elevated CO₂ 	<ul style="list-style-type: none"> • Grain • Water 	<ul style="list-style-type: none"> • Fermenters • Silos 	<ul style="list-style-type: none"> • Mash mixer • Lauter tun rake
			

HOW DO YOU PROPERLY ENTER A PERMIT-REQUIRED CONFINED SPACE?

ENTERING MEANS

If any part of the entrant's body breaks the plane of an opening into a confined space...

YOU MUST HAVE

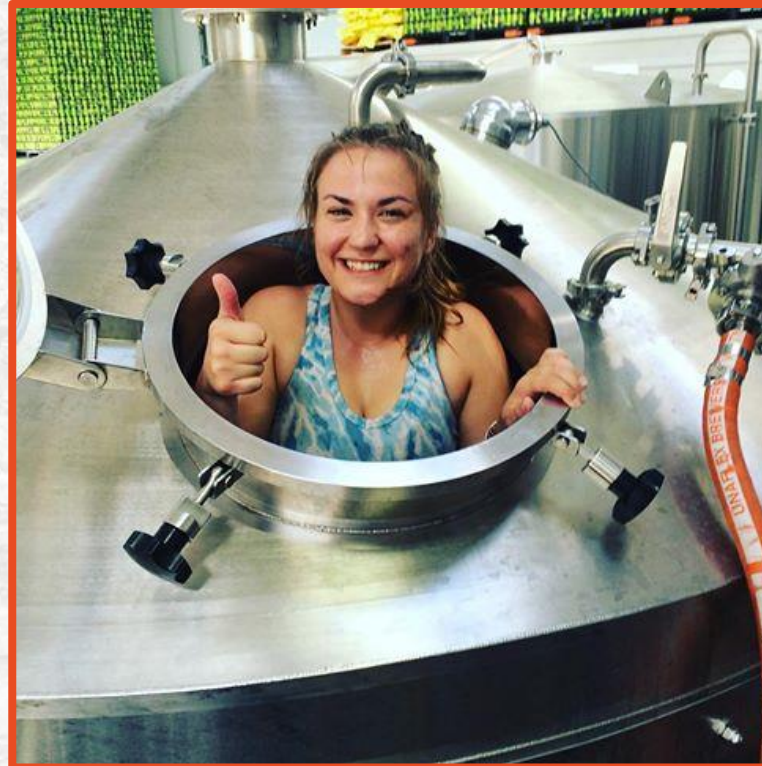
- Written Program
- Hazard Assessment of Spaces
- Entry Permits
- Atmospheric Testing
- Specific Safe Procedures
- Authorized Entrant, Attendant
- Emergency Rescue Procedures
- Training



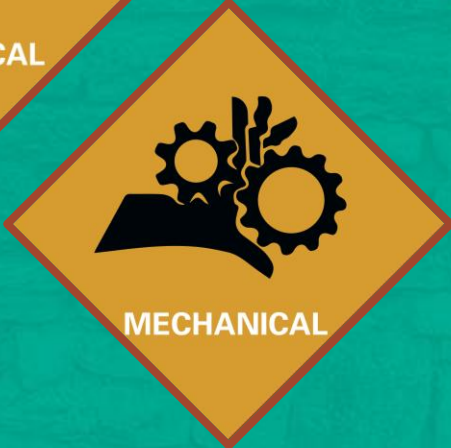
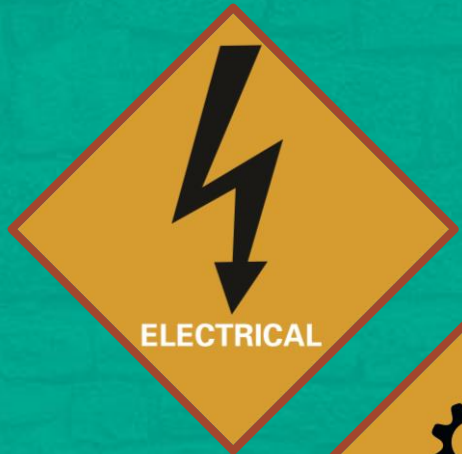
IS THERE AN ALTERNATIVE TO PRCS ENTRY REQUIREMENTS?

RECLASSIFICATION

- Space poses no actual or potential atmospheric hazard
- All hazards within the space can be eliminated without entry into the space (LO/TO)
- Useful for **Brewhouse Vessels – MT, LT, BK, WP**
- **Documentation**
 - Written Program
 - Hazard Assessment
 - Written Procedure, including LO/TO
 - Training



CONTROL OF HAZARDOUS ENERGY (LO/TO)

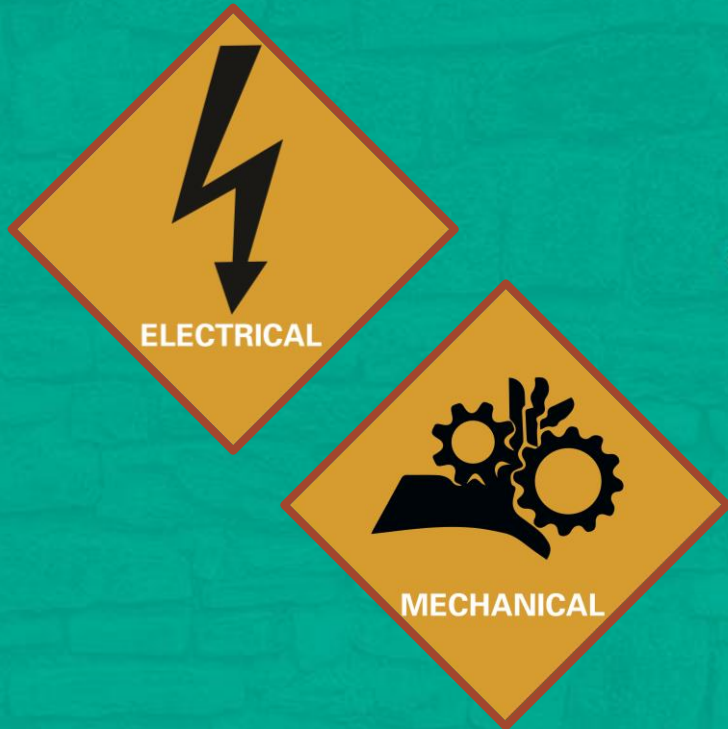


LOCKOUT / TAGOUT

- To isolate and control hazardous energy sources
 - Electrical
 - Mechanical
 - Pneumatic, etc.
- LO/TO equipment is specialized
 - Use LO/TO devices only for LO/TO work



CONTROL OF HAZARDOUS ENERGY (LO/TO)



WHEN TO USE LO/TO

- Remove or bypass any safety device on a piece of machinery
- Place any part of your body into a point of operation where a danger zone exists during an operating cycle



LO/TO HAZARD ASSESSMENT - ACHIEVE A ZERO ENERGY STATE

TASKS

- **Brewhouse Vessel Cleaning**
- **Packaging**
 - Conveyors
 - Fillers
 - Drop Packers
 - Palletizers
- **Single Sources**
 - Electric Cords

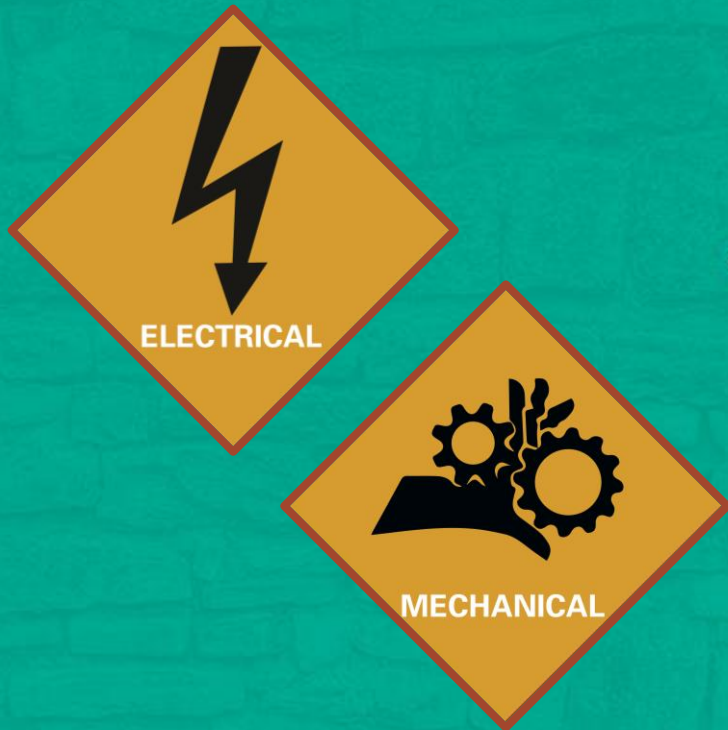
HAZARDS

- **Mechanical Hazards**
 - Crush/Pinch
 - Flying Objects
- **Electrical**
 - Electric shock
 - Electrocutation
- **Fluid Energy Release**
 - Bodily Injury

CONTROLS

- **Engineering**
 - LO/TO Devices
- **Administrative**
 - Energy Control Procedures
 - SOPs & Training

CONTROL OF HAZARDOUS ENERGY (LO/TO)



TYPES OF HAZARDOUS ENERGY

- Electrical
- Mechanical
- Stored or potential (springs, gravity, etc.)
- Thermal
- Hydraulics (fluid) or pneumatic (air)
- Chemical
- Radiation (nuclear gauges)



ENERGY CONTROL PROCEDURE (ECP)

ECP is an SOP that describes shutdown and startup for systems with multiple energy sources

- **Procedural steps**
 - shutting down
 - isolating, blocking, and securing
 - restoring

- **Procedural steps**
 - placement, removal, and transfer of LO/TO devices
 - who has responsibility for them
- **Requirement for testing a piece of equipment to verify effectiveness of LO/TO devices – a.k.a. The TRY STEP**

“TRY” STEP

- **Verifies isolation**
- **May release residual or stored energy**
- **Confirms correct energy sources are controlled**
- **Keep persons safe while performing the Try Step**

ENERGY CONTROL PROCEDURE (ECP)

EQUIPMENT-SPECIFIC

- Often includes images
- Color-coded energy control points

ONLINE ECP GENERATORS

- Subscription-based
- Some free tools available

LOSS PREVENTION MANAGEMENT SERVICES
Safety & Operational Training | Assessments

Lockout Tagout Posted Procedure

Description: Chilled Water Pump - 13	Created: January 1, 2015	By: LP Management Services
Facility: 123 Corporate Dr, Chicago IL	Revised:	By:
Location: 1st Floor Chiller Room	Revised:	By:

3 LOTO Points **Note:** Hydraulic pressure can be stored in this equipment. Ensure all pressure is bled off before servicing.
VFD has internal capacitors which store electrical energy. Ensure to properly dissipate energy before servicing.

Next Audit Due January 2016	Next Audit Due January 2017	Next Audit Due January 2018	Next Audit Due January 2019
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LINK360 Lockout/Tagout Posted Procedure

ID#: 1234567890	Facility: Test Area: (Good Hope) -	Location: CDC Shop Floor
Created: 10/8/2013	CDC	
Revised: 10/8/2013	Description: HTST-1 Separator	

5 Lockout Points **Note:** Hydraulic and pneumatic equipment can store energy. Ensure all pressures have bled off before proceeding. - ALSO - Machine can store kinetic energy. Ensure machine has come to a complete stop before proceeding.

Lockout Application Process

1. Notify affected personnel. 2. Properly shut down machine. 3. Isolate all energy sources. 4. Apply lockout devices, locks, & tags. 5. Verify total de-energization of all sources.

Energy Source	Location	Method	Device	Verification
1 Electrical 480V	Disconnect is located on MCC SWBB21 (Bucket 1).	Turn Disconnect to the off position and lock out.	Lock and hasp	Attempt restart at all control panels.
2 Pneumatic 100 PSI	Ball Valve P-1 is located on the South side of the machine.	Turn Valve to the off position and lock out.	Lock and hasp	Verify pressure has bled off.
3 Water City Water Supply	Ball Valve W-1 is located on the East side of the machine.	Turn Valve to the off position and lock out.	Ball valve lockout	Verify pressure has bled off.

Location	Method
Isolation point is near CWP-13.	Open Disconnect VFD-CWP-13 and Lockout.
Isolation point is near CWP-13.	Shut Valve CWS-15 and Lockout.
Isolation point is near CWP-13.	Shut Valve CWS-16 and Lockout.

Shutdown Sequence

1. Reconfiguration of plant may be required prior to isolation. Approved shut down procedures.
2. Line or equipment will be shut down and locked out.
3. Manufacturer's recommendations and approved/accepted procedures.
4. Local LOTO procedure to isolate the machine from all energy sources.
5. Properly filled out tags to isolation points.
6. Isolation point to verify the effectiveness of the locking device(s)/method(s).
7. Isolation point to verify the effectiveness of the locking device(s)/method(s).
8. If, then, if applicable, attempt to restart machine or equipment.
9. Energy storage devices such as springs, capacitors etc.
10. Dead-live test.
11. Check for mechanical blocks or electrical grounding.

Return to Service Sequence

1. Ensure nonessential items have been removed.
2. Verify all isolations have been safely positioned or removed from the area.
3. "off" position.
4. Re-energize the machine according to approved/accepted procedures.
5. Verify all isolations are complete and isolations have been removed.

LO/TO DEVICES

LOCKS

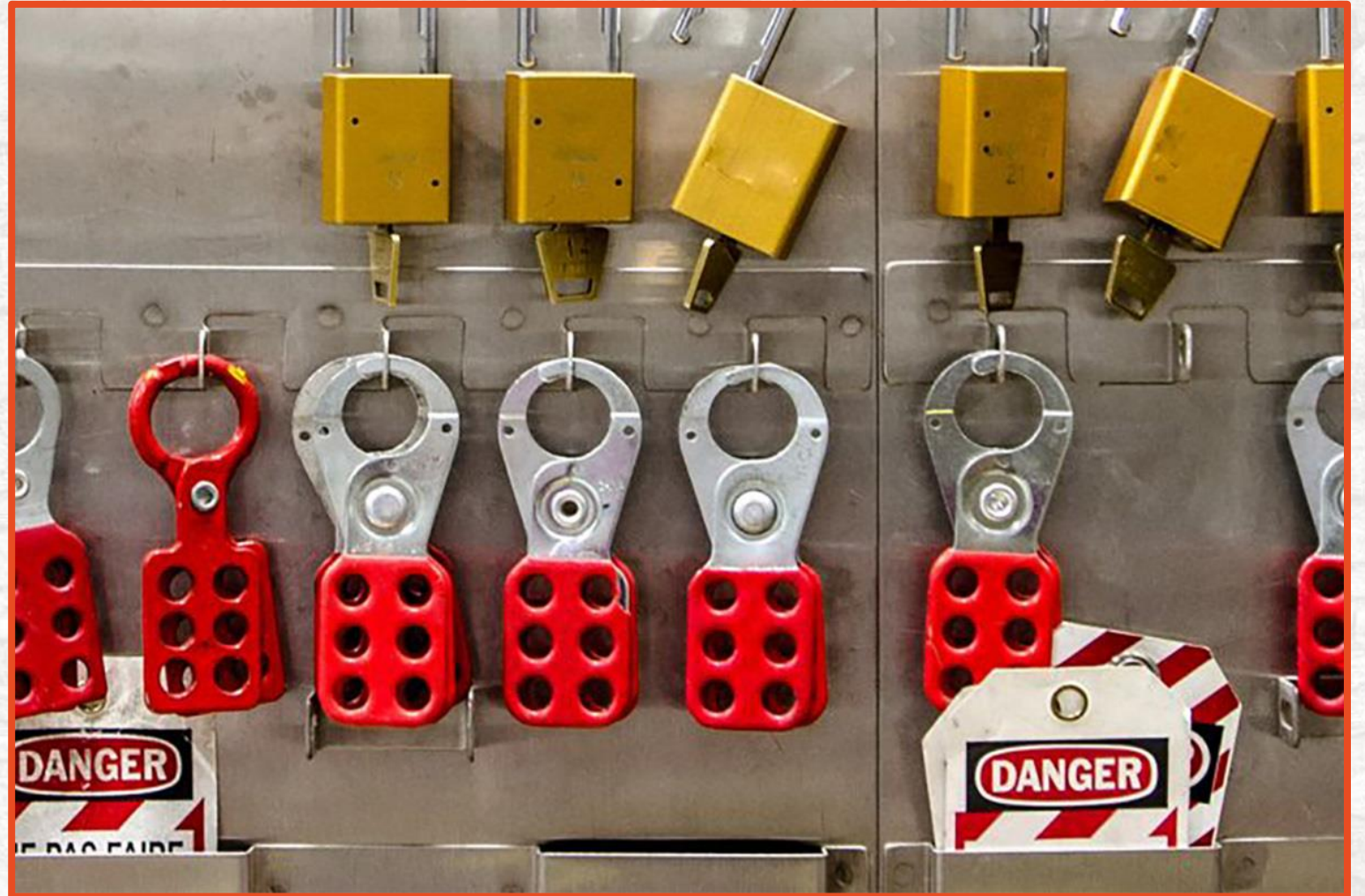
- Only used for LO/TO
- Only 1 key
- Key kept by operator being protected by LO/TO

TAGS

- Provide a message

HASPS

- Allow multiple locks



LO/TO DEVICES

LOCK BOXES

- Isolate small equipment from use
- Allow multiple keys to be locked



LO/TO DEVICES

ELECTRICAL TYPES

PLUG LOCKOUT

- Isolates plug end from being plugged in

BREAKER DEVICES

- Isolates energy at electrical panel

DISCONNECT LOCKOUT

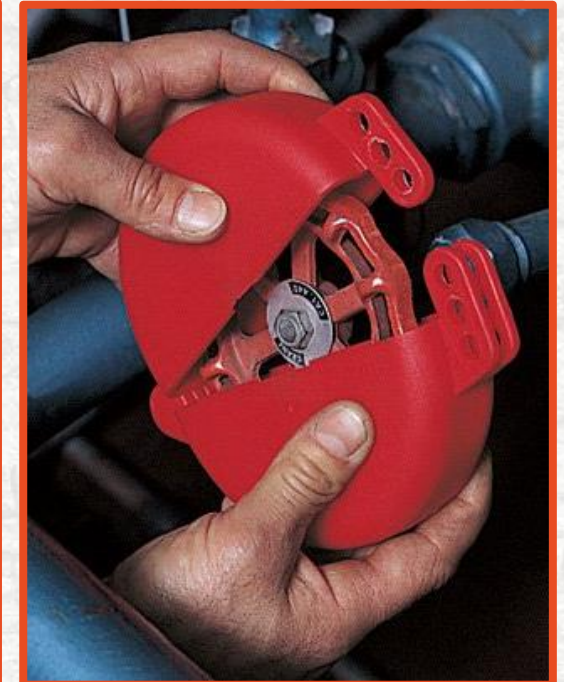


LO/TO DEVICES

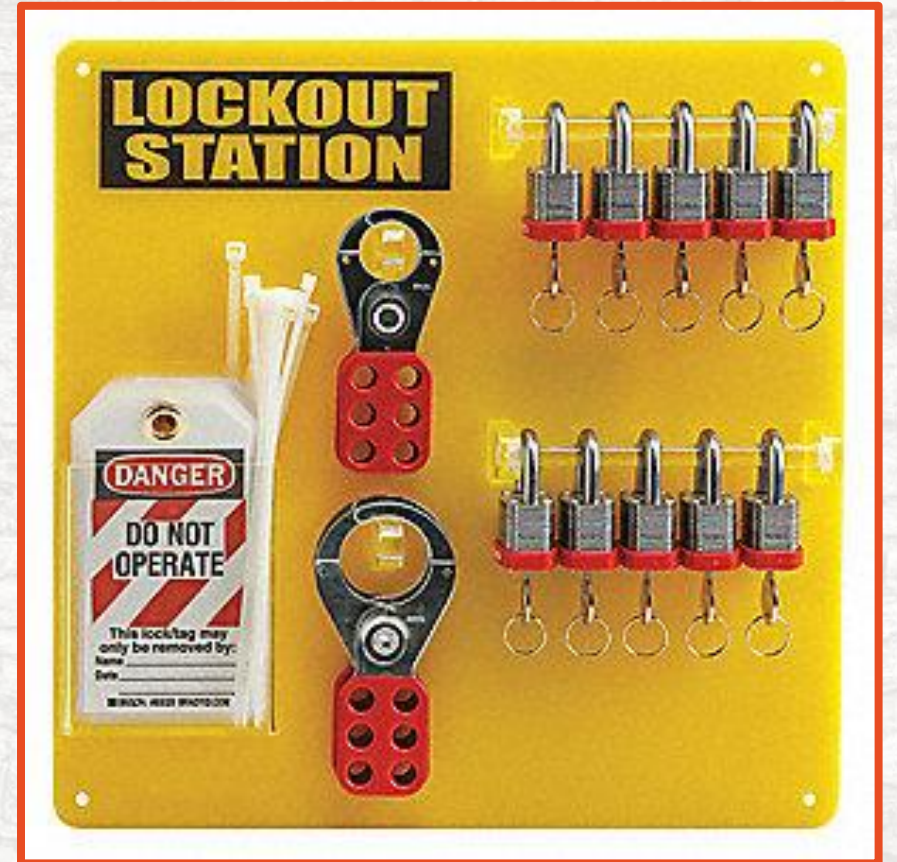
FLUID CONTROL

VALVE DEVICES

- Ball valve
- Butterfly
- Gate valve



LO/TO DEVICE KITS AND STATIONS



SAFE OPERATIONS DURING COVID-19

TAKE
ACTION



BIOLOGICAL



CHEMICAL

EFFECTIVE CLEANING / DISINFECTION,
RESTARTING YOUR BREWERY AND THE NEW
REALITY OF CUSTOMER INTERACTIONS

COVID-19 VIRUS



FACILITY CONSIDERATIONS



COVID-19 HAZARD ASSESSMENT

TASKS

- **Human Interactions**
 - Coworkers
 - Customers
 - Suppliers
- **Production Restart**
 - Ingredients
 - Utilities
 - Production Equipment

HAZARDS

- **Viral Transmission**
 - Airborne aerosols
 - Surface contact
 - Distancing non-compliance
- **Chemical Cleaners/ Sanitizers**
- **Energized Systems**
 - Pumps, mixers, conveyors that have been dormant

CONTROLS

- **Administrative**
 - Training, new SOPs
 - Distancing
 - Signs and Floor Tape
- **Engineering**
 - Chemical cleaners and sanitizers
 - Facility PM
 - LO/TO on restart
- **PPE**
 - Face coverings
 - Gloves

COVID-19 - IMPORTANT CHEMICAL ADVICE

GENERAL PRINCIPLES

- **Cleaning vs Sanitizing**
 - Clean surfaces then use sanitizer
 - Quats do both
- **Where to Use What?**
 - Brewery chems stay in brewery
 - No corrosive chems on humans or human contact surfaces (HCSs)
 - Review SDSs

PRODUCTION AREAS

- **Inside Brewing Equip.**
 - Typical caustics, acids
 - Oxidizing sanitizers
- **Outer Surfaces**
 - May have become moldy
 - Foaming cleaners and quats
- **Staling**
 - Dump dormant water
 - Dispose of beer appropriately

FRONT OF HOUSE

- **Cleaning HCSs**
 - Ammonia
 - Citrus-based cleaners
- **Sanitizing HCSs**
 - Quats
 - Alcohol
 - Bleach solution
- **Administrative**
 - SOPs for all staff
 - How to make up/use cleaners/sanitizers

Coronavirus Resource Center

COVID-19 VIRUS



EXCELLENT
RESOURCES



www.brewersassociation.org/brewing-industry-updates/coronavirus-resource-center/

On-Premise Establishment Information

- Department of Labor: [OSHA Guidance for Restaurants & Beverage Vendors Offering Takeout or Curbside Pickup](#)
- CBC Online Seminar: [Crafting a Contactless Hospitality Program](#)
- Brewers Association: [Checklist for Reopening Guide](#)
- Brewers Association Power Hour: [Nielsen CGA's COVID-19 On-Premise Impact Report – Issue 2](#)
- Brewers Association: [Best Practices in Preparation for Re-opening After Extended Draught System Shutdown](#)
- Brewers Association: [Draught Quality Recommendations During Extended Bar/Restaurant Shutdown](#)
- Brewers Association: Sanitary draught practices – [Draught Beer Quality Manual](#) (pgs. 56-60)
- Brewers Association: [Food Safety Plan for Craft Brewers](#)
- Department of Labor: [Occupational Safety and Health Administration COVID-19 Overview](#)
- Department of Labor: [Questions about Family Medical Leave Act and Fair Labor Standards Act](#)
- Department of Labor: Families First Coronavirus Response Act Notice (Required to be posted at businesses on April 1, 2020)
 - [Families First Coronavirus Response Act Poster \(Non-Federal Employees\)](#)
 - [Families First Coronavirus Response Act Notice FAQ](#)
- EPA-approved list of [Coronavirus antimicrobial products](#)
- National Restaurant Association: [Coronavirus – Tips for Restaurants](#)
- National Institutes of Health: [NIH study validates decontamination methods for re-use of N95 respirators](#)
- U.S. Small Business Association (SBA): [Disaster Assistance Loans & COVID-19](#)

Manufacturing Information

- Brewers Association: [Best Practices for Responsible Disposal of Beer](#)
- Brewers Association: [Cleaning Resources](#)
- Brewers Association: [Good Manufacturing Practices for Craft Brewers](#)
- Brewers Association: [Sanitation Resources](#)
- Centers for Disease Control and Prevention: [Interim Guidance for Businesses and Employers](#)
- Occupational Safety and Health Administration: [COVID-19 Control and Prevention](#)

Business Continuation & Communication

- Brewers Association Video Series: [Strengthening Your Financial Foundation in the COVID-19 Era](#)
- Brewers Association Power Hour: [Forecasting Cash Flow Needs During Times of Turbulence](#)
- Brewers Association Power Hour: [Beer in a Time of Disruption: Know Your Legal Options](#)
- Brewers Association: [Crisis Communication Template](#)
- National Restaurant Association: [COVID-19 Business Continuation Planning Basics](#)
- U.S. Chamber of Commerce: [Staying Connected with Customers Through the Coronavirus Outbreak](#)
- U.S. Chamber of Commerce: [5 Resources to Help Your Business Survive the Corona Virus](#)
- U.S. Department of the Treasury: [Treasury and IRS Issue Guidance on Deferring Tax Payments Due to COVID-19 Outbreak](#)




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COVID-19 VIRUS



STAFF AND CUSTOMER MANAGEMENT



COVID-19 - IMPORTANT EMPLOYEE RECOMMENDATIONS

TRAINING BEFORE REOPENING

- **Internal Staff Policies**
 - Distancing
 - Proper PPE use
 - Handwashing
 - Notification of possible illness
 - Pre-shift monitoring
 - Employee rights under FFCRA

• Customer Areas

- New floor plans
- Educating customers on your program
 - Website
 - Signs on doors
 - Floor markings
- Cleaning/sanitizing methods, frequencies
- Allowable group sizes and occupancy
- How to handle high touch surfaces
 - Payment systems
 - Doors/Tables/Chairs
 - Restrooms

KEY DOCUMENTATION

- **Create SOPs**
 - Staff handwashing
 - Surface sanitizing
 - What surfaces?
 - What methods?
 - What frequencies?
- **Require Checklists**
 - Cleaning frequencies
 - Occupancy counts

COVID-19 VIRUS



REQUIRED PAID LEAVE POSTER

EMPLOYEE RIGHTS

PAID SICK LEAVE AND EXPANDED FAMILY AND MEDICAL LEAVE UNDER THE FAMILIES FIRST CORONAVIRUS RESPONSE ACT

The Families First Coronavirus Response Act (FFCRA or Act) requires certain employers to provide their employees with paid sick leave and expanded family and medical leave for specific reasons related to COVID-19. These provisions will apply from April 1, 2020 through December 31, 2020.

PAID LEAVE ENTITLEMENTS

Generally, employers covered under the Act must provide employees:

Up to two weeks (80 hours, or a part-time employee's two-week equivalent) of paid sick leave based on the higher of their regular rate of pay, or the applicable state or Federal minimum wage, paid at:

- 100% for qualifying reasons #1-3 below, up to \$511 daily and \$5,110 total;
- 2/3 for qualifying reasons #4 and 6 below, up to \$200 daily and \$2,000 total; and
- Up to 12 weeks of paid sick leave and expanded family and medical leave paid at 2/3 for qualifying reason #5 below for up to \$200 daily and \$12,000 total.

A part-time employee is eligible for leave for the number of hours that the employee is normally scheduled to work over that period.

ELIGIBLE EMPLOYEES

In general, employees of private sector employers with fewer than 500 employees, and certain public sector employers, are eligible for up to two weeks of fully or partially paid sick leave for COVID-19 related reasons (see below). Employees who have been employed for at least 30 days prior to their leave request may be eligible for up to an additional 10 weeks of partially paid expanded family and medical leave for reason #5 below.

QUALIFYING REASONS FOR LEAVE RELATED TO COVID-19

An employee is entitled to take leave related to COVID-19 if the employee is unable to work, including unable to telework, because the employee:

- | | |
|---|---|
| <ol style="list-style-type: none">1. is subject to a Federal, State, or local quarantine or isolation order related to COVID-19;2. has been advised by a health care provider to self-quarantine related to COVID-19;3. is experiencing COVID-19 symptoms and is seeking a medical diagnosis;4. is caring for an individual subject to an order described in (1) or self-quarantine as described in (2); | <ol style="list-style-type: none">5. is caring for his or her child whose school or place of care is closed (or child care provider is unavailable) due to COVID-19 related reasons; or6. is experiencing any other substantially-similar condition specified by the U.S. Department of Health and Human Services. |
|---|---|

ENFORCEMENT

The U.S. Department of Labor's Wage and Hour Division (WHD) has the authority to investigate and enforce compliance with the FFCRA. Employers may not discharge, discipline, or otherwise discriminate against any employee who lawfully takes paid sick leave or expanded family and medical leave under the FFCRA, files a complaint, or institutes a proceeding under or related to this Act. Employers in violation of the provisions of the FFCRA will be subject to penalties and enforcement by WHD.



WAGE AND HOUR DIVISION
UNITED STATES DEPARTMENT OF LABOR

For additional information
or to file a complaint:
1-866-487-9243
TTY: 1-877-889-5627
dol.gov/agencies/whd



WH1422 REV 03/20

https://www.dol.gov/sites/dolgov/files/WHD/posters/FFCRA_Poster_WH1422_Non-Federal.pdf

IMPORTANCE OF CULTURE...

NOW MORE THAN EVER

Five Things to Keep in Mind

- Rules, core values do not take the place of culture; just a small part of it
- Culture is all encompassing, constantly growing, changing
- Your brewery will have a culture, make it the one you want
- Yeast makes beer, people make breweries
- As you have to pivot your business model, it's a great opportunity to pivot to a more inclusive, safe, and successful culture.

Social Media Handles

@BrewersAssoc

#CraftBrewersCon

#BrewerySafety

#BrewSafely

**Brewery Safety
Bootcamp – *ONLINE!***

We Thank You For Your Attention!