

**- Part 2-**

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

Physical Safety, Material Handling, Chemical Safety

May 14, 2020

# CRAFT BREWERS CONFERENCE & BrewExpo America<sup>®</sup>

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*your partner in craft brewery sanitation*



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Brewers Association

Boulder, Colorado



@MattStinchfield

#SafetyAmBadAssador



mstinchfield



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Safety Manager

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# PHYSICAL HAZARDS

ELECTRICAL



SHARPS



NOISE



ELEVATION



ELECTRICITY, PRESSURE, NOISE,  
MOVING PARTS AND GRAVITY

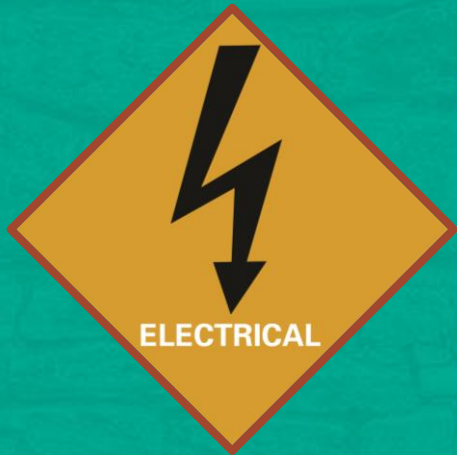
MECHANICAL



PRESSURE



# ELECTRICAL HAZARDS



U.S. workers	Number	Result
Yearly	4,000	Non-disabling electrical shock injuries
Yearly	3,600	Disabling electrical shock injuries
Every year	2,000+	Electrical burns require stay at burn centers

At least 1 person is electrocuted at work every day.

# ELECTRICAL HAZARD ASSESSMENT

## TASKS

- Grist mill, conveyors
- Pumps, mixers
- Chillers
- Power tools
- Packaging lines
- Office/retail equipment
- Kitchen appliances

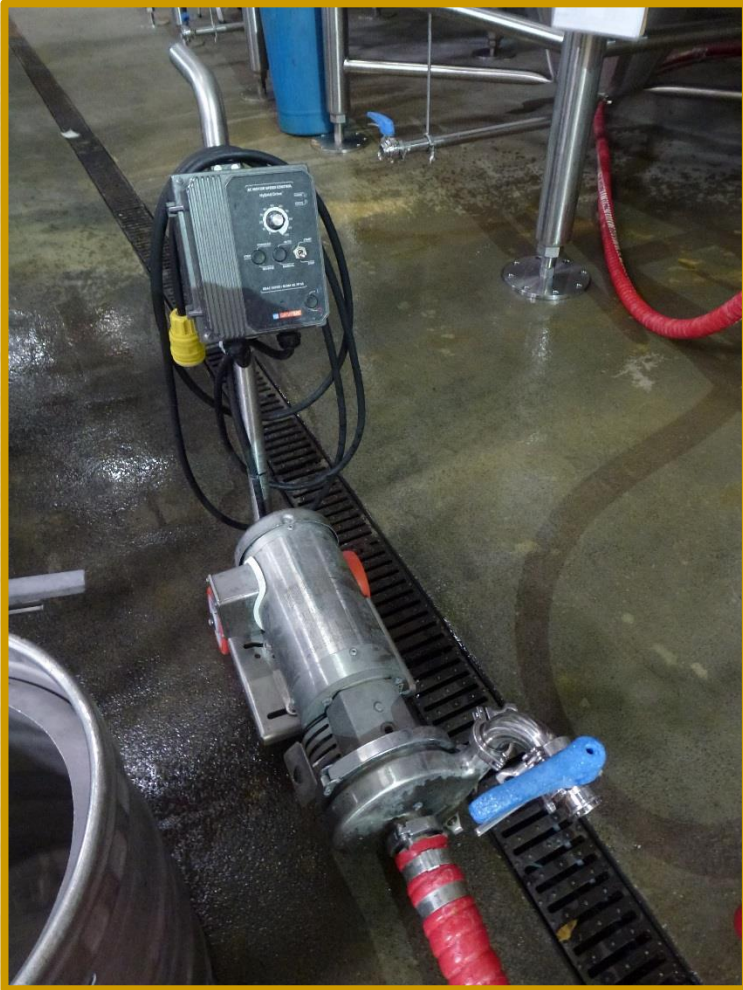
## OUTCOMES

- Electric shock
- Electrocutation
- Arc flash/blast
- Damage to equipment
- Building fire

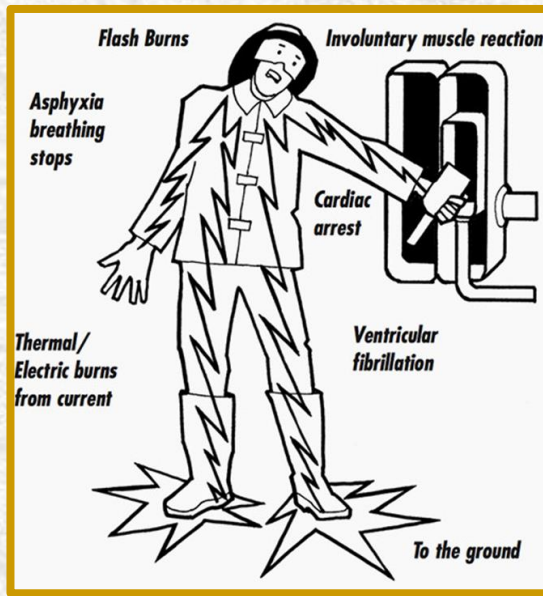
## CONTROLS

- No openings in boxes or covers
- Rated for amps required
- Switches, GFCIs, Disconnects, Grounds
- Equipment access in emergency
- No cords through doors, openings, walls...

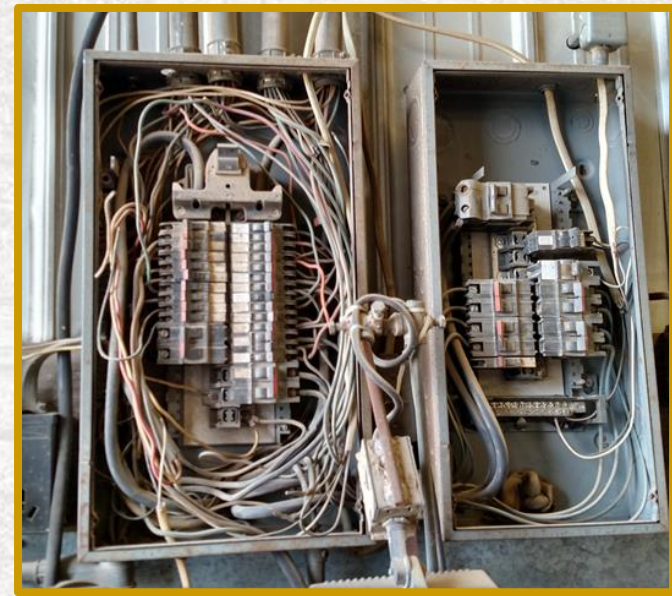
# LOOK AT YOUR PUMP MOTOR: HIGHER VOLTAGE USES LOWER AMPERAGE





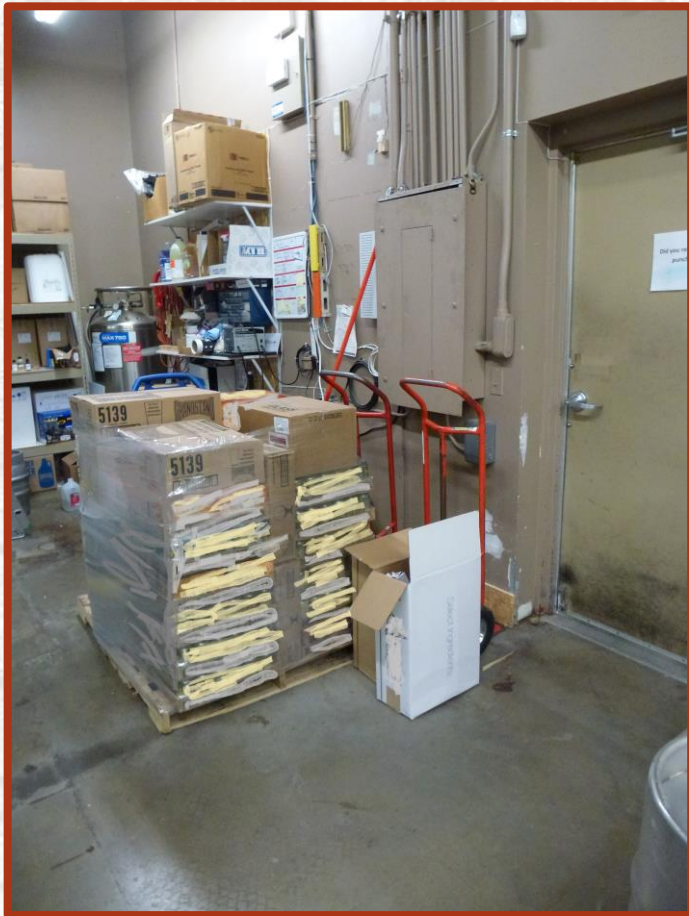


## WHEN DO I FEEL A SHOCK?



CURRENT	PHYSIOLOGICAL RESULT	FEELING OR LETHAL INCIDENCE
1 mA	Perception threshold	Tingle
2 – 10 mA	Sensation of shock	Maintain muscle control, not painful
<b>5 mA</b>		<b>GFCI trips</b>
10 – 20 mA	Paralysis threshold of arms	Cannot release hand grip, may be thrown clear
20 – 50 mA	Respiratory paralysis	Breathing stops, usually fatal
50 – 200 mA	Fibrillation threshold	Heart beat uncoordinated, usually fatal
>200 mA	Tissue burns	Non-fatal unless are vital organs

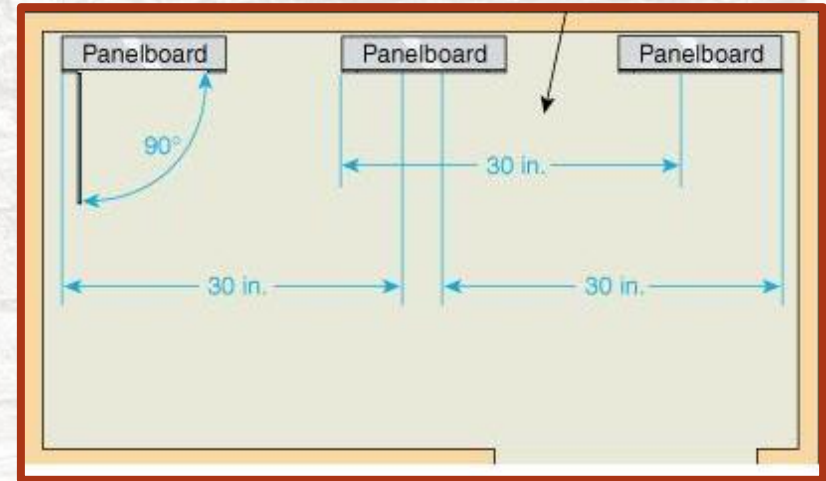
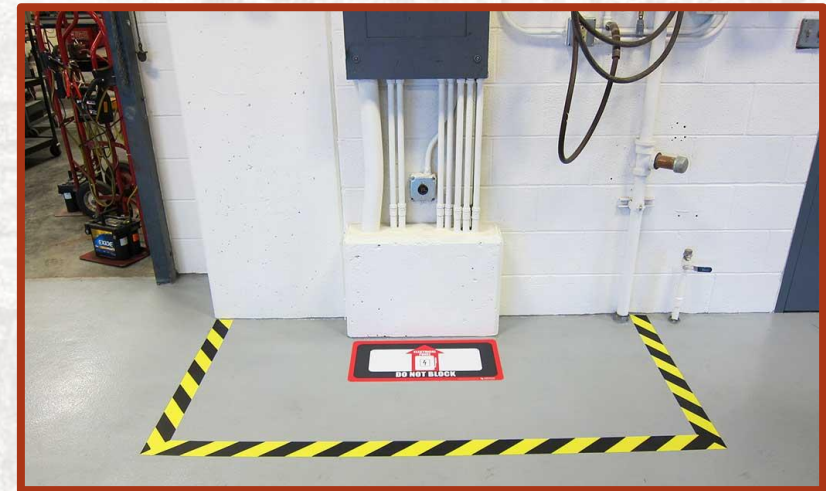
# KEEP CLEAR ACCESS FOR AN EMERGENCY



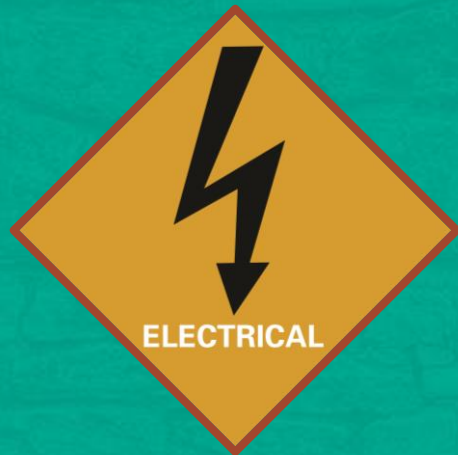
**RIGHT** →

**CAUTION**  
AREA IN FRONT OF THIS  
ELECTRICAL PANEL MUST BE  
KEPT CLEAR FOR 36 INCHES.  
OSHA-NEC REGULATIONS

← **WRONG**

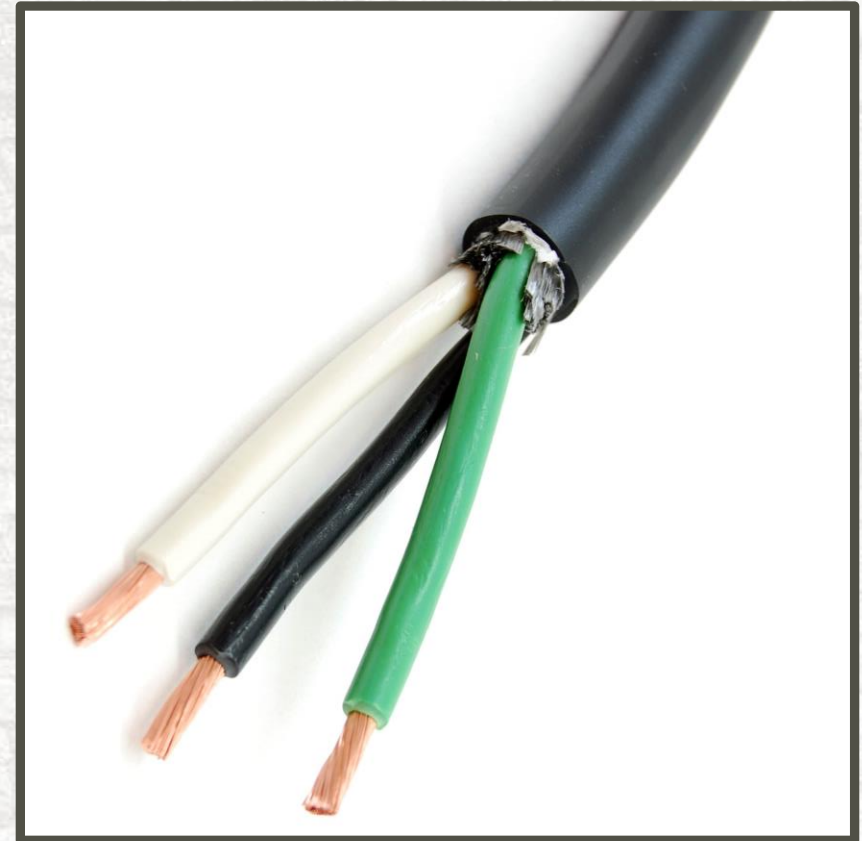


# EXTENSION CORDS



## SELECTION

- Protective jacket over insulated conductors
- Read instructions for use and amps.
- Select cords rated for your current
- Thick, round, big gauge, high amp cords are best



# EXTENSION CORDS

## READ THE CORD!

- S – Flexible cord
- W – Outdoor use
- J – 300V insulation
- No J – 600V insulation
- P – Parallel wire construction, used in air conditioner cords and household extension cords

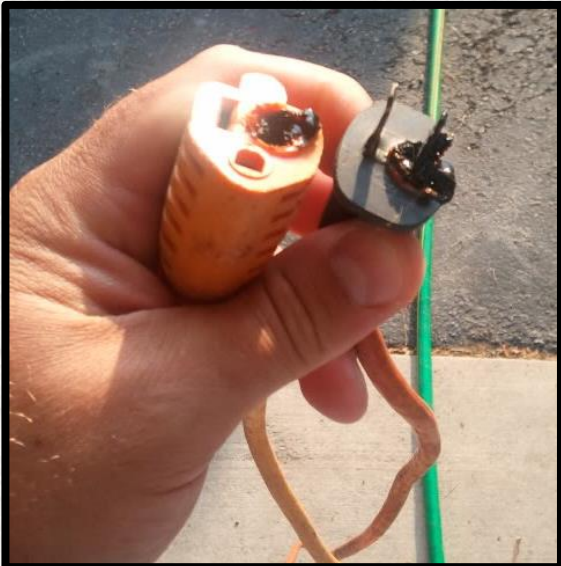
- T – vinyl thermoplastic Jacket
- E – thermoplastic elastomer rubber (TPE)
- O – Cord is oil-resistant

- Wire Gauge and Number of Conductors  
e.g. 18/3, 8/4



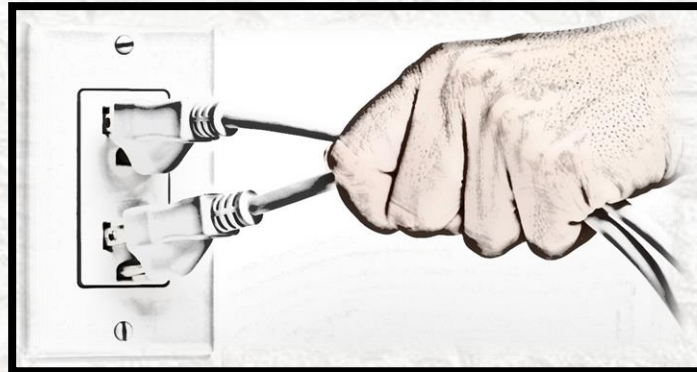
## CORD CARE

- Outlet, cover plate get hot
- Plug ends gets hot at outlet box
- Both plugs get hot
- Entire cord gets hotter
- Transfer of electricity across a gap creates heat



## LOVE YOUR CORD

- Pull on the plug
- Unplug from outlet first, then tool
- Power arcs across the connection
- Avoid touching when wet
- Unplug it
- Cords are temporary; add more outlets

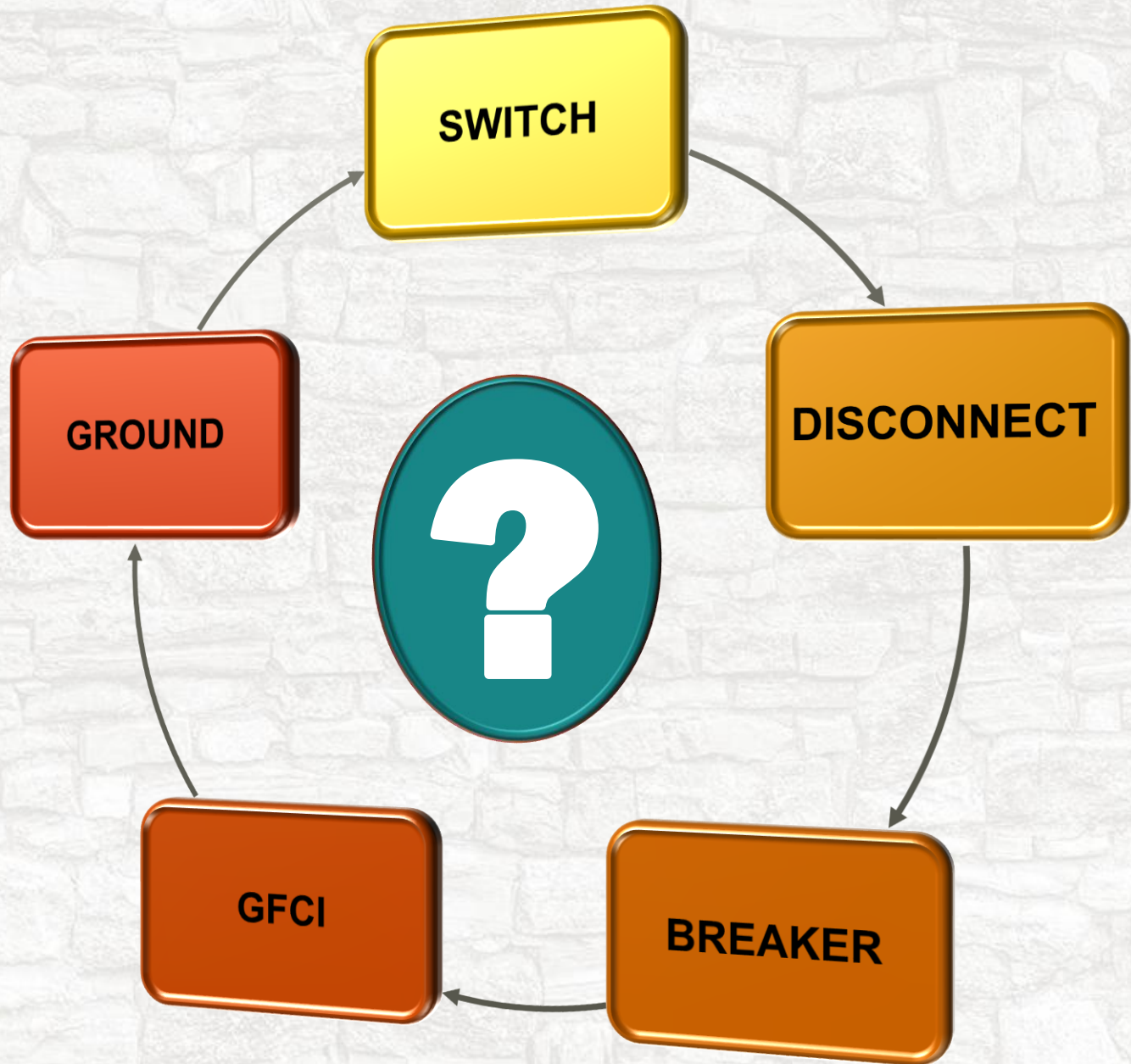
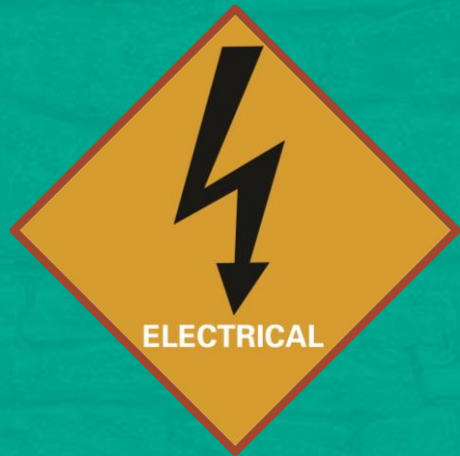


## ROLLED CORDS

- Current heats cords
- Inductive coupling magnifies heat
- Stop using hot cord

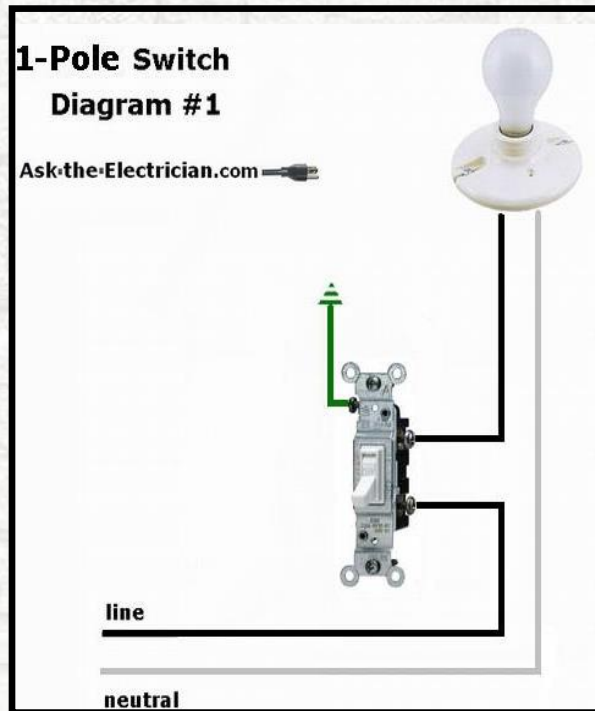


# GROUNDING AND CIRCUIT INTERRUPTORS

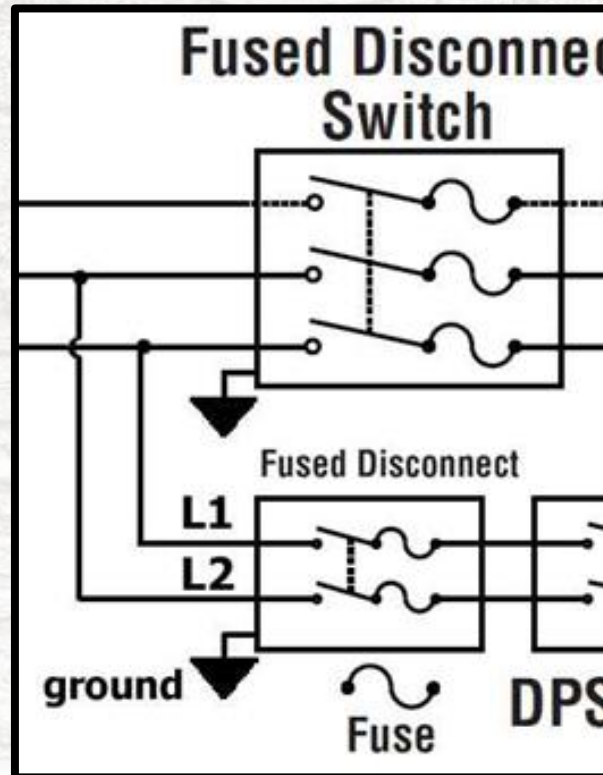


# GROUNDING AND CIRCUIT INTERRUPTORS

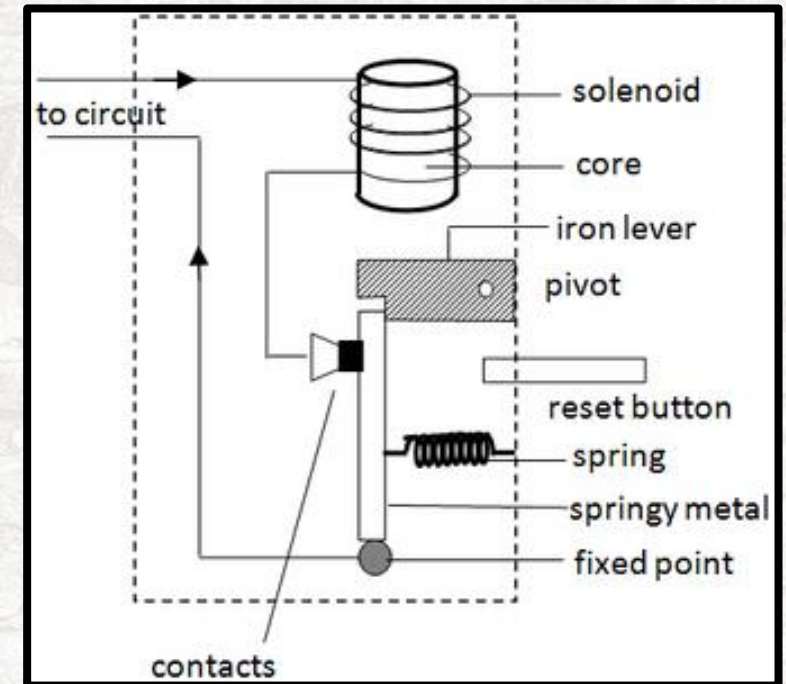
## SWITCH



## DISCONNECT

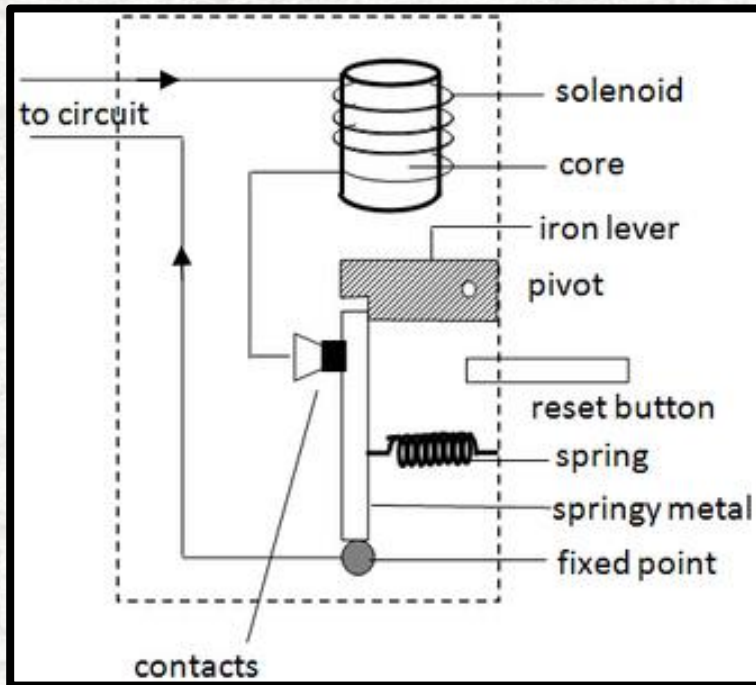


## BREAKER

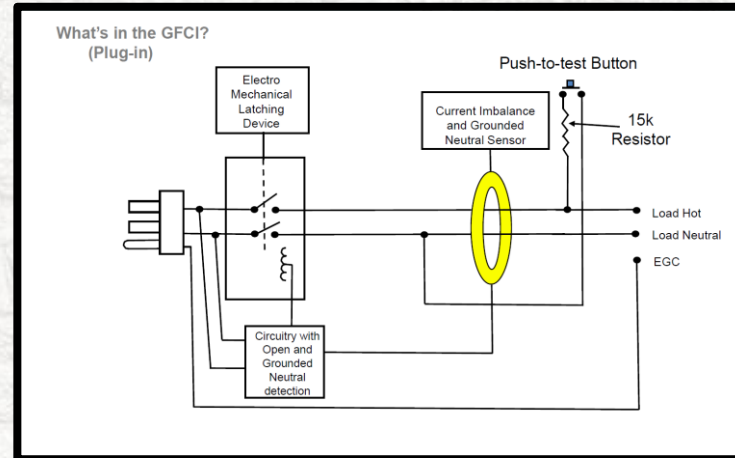


# GROUNDING AND CIRCUIT INTERRUPTORS, continued

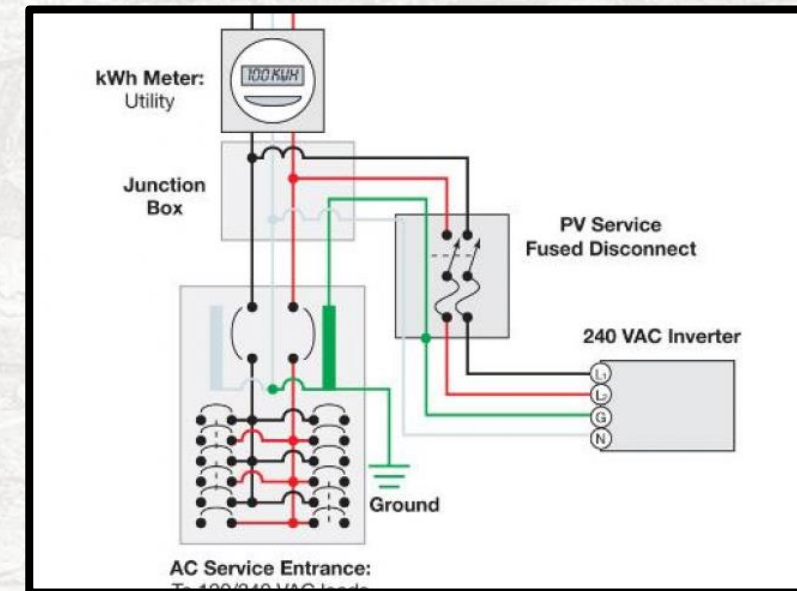
## BREAKER



## GFCI



## GROUND





# ELECTRICAL HAZARD CONTROLS

## SWPs

- Squeegee floors
- Reduce water
- Close panels
- Clean dust out of panels
- Minimize extension cords
- Dust off outside of equipment

## RESPECT “WASHDOWN”

- Motors are not water-tight
- Drain holes in bottom
- You can get shocked



## SHUTOFFs

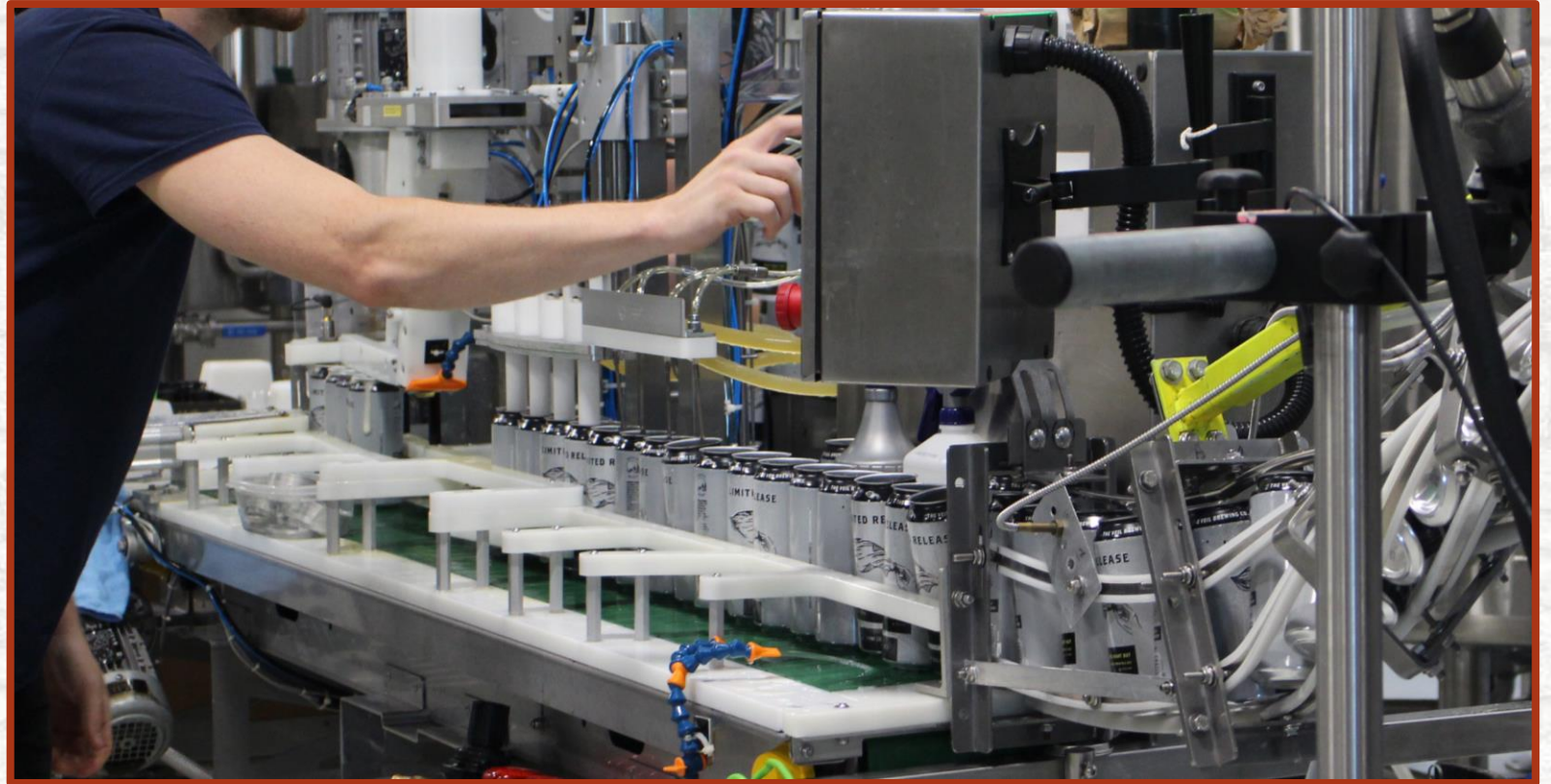
- Disconnect not a switch
- “within sight of” equipment
- “easy to reach”
- Clearly indicates OFF
- OFF is always down



# MECHANICAL HAZARDS



PINCH, CUT,  
CRUSH AND  
ERGONOMIC  
HAZARDS



# PINCH, CRUSH, CUT AND ERGONOMICS HAZARD ASSESSMENT

## TASKS

- Grain Milling & Conveying
- Pumping, Mixing
- Material Handling
  - Grain bags, boxes, pallets
  - Lifting beer kegs, cartons
- Packaging Beer
- Taproom, Kitchen Activities

## OUTCOMES

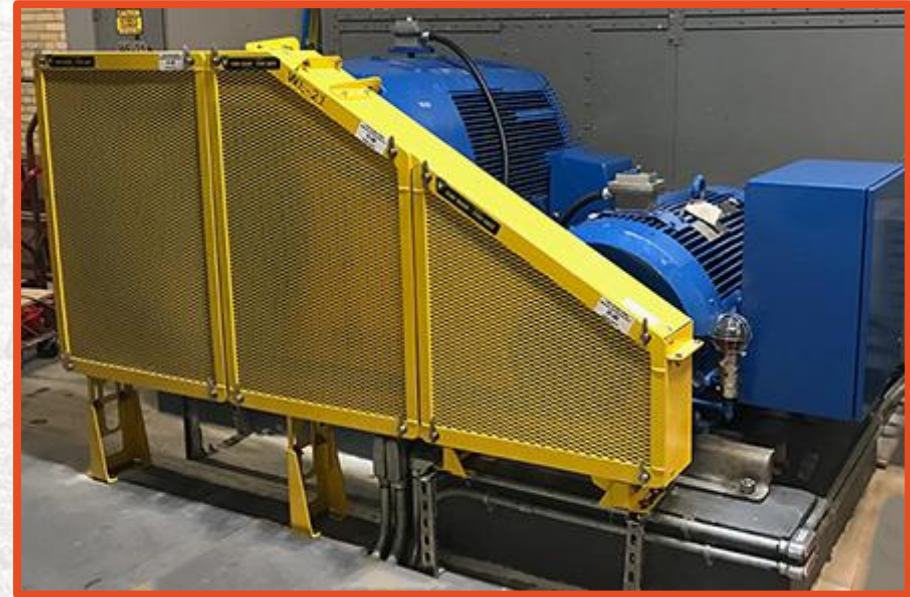
- Crushed, Amputated Parts
- Broken Bones
- Eye Injury
- Laceration, Infection
- Back, RMD
- Forklift – “caught between”
- Damage to equipment

## CONTROLS

- Use proper fittings, not hardware store fixes
- Machine guarding
- Hands out of moving equipment
- LO/TO
- Safe knife use
- PM schedules

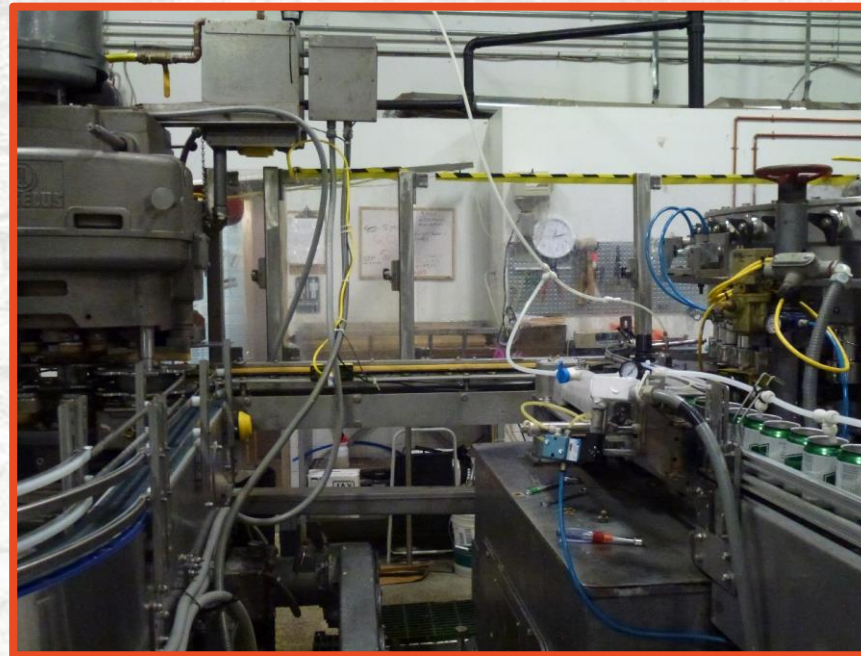
# MACHINE GUARDING

- How large can the openings be?
- If can touch, what bites?
- Emergency shutoff



# MACHINE GUARDING ENGINEERING CONTROLS

- Machine guarding, safety windows
- Interlocks, process logic controls
- Good repair / with PM program
- Lockout/tagout
- Guards limit water travel
- Body protection
- Sound barrier



# NOISE HAZARDS



## NOISE SOURCES

- Grist mills
- Pumps
- Centrifuges
- Packaging Lines
- Air Compressors
- Loud Music Systems
- Personal Listening



## NOISE CONTROLS

- Isolate workers from noise
- Insulated rooms, walls
- Hearing protection
  - Voluntary
  - HPP
- Hearing rule of thumb

**You need to be able to hear your brewing systems: mill, pumps, bearings, HLT/CLT, co-workers, etc.!**

# HAND AND POWER TOOL HAZARDS



MECHANICAL



ELECTRICAL



# HAND AND POWER TOOL HAZARD ASSESSMENT

## TASKS

- Maintenance / Repair
- Custodial
- Building Trades
- Special Construction
  - R & D
  - Festival Decoration
  - Seating
  - Security

## OUTCOMES

- Tool Related Injury
  - Flying objects
  - Electric shock
  - Laceration or puncture
  - Noise
- Damage
  - Stripped fasteners
  - Damage to tool itself

## CONTROLS

- Eye and hand protection
- Trained in tool use
- Regular inspection
  - Power cord
  - Fittings, couplings
  - Wear and tear
- Repair and replacement





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# HAZARD WARNING SIGNS

BREWERY  
HAZARDS



# Standardized Key Words and Color Schemes

## CAUTION

Minor to Moderate  
Injury Potential



Black on Yellow

## WARNING

Death or Serious  
Injury is Possible



Black on Orange

## DANGER

Death or Serious  
Injury Likely

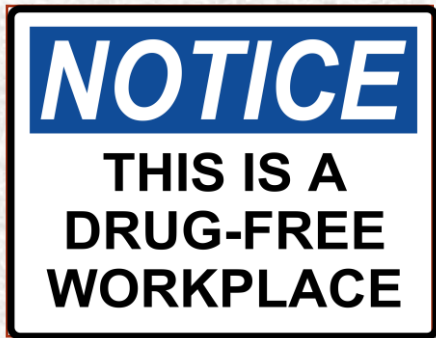


Black and Red on  
White Background

# Standardized Key Words and Color Schemes

## NOTICE

General  
Information



Blue Panel on White

## INSTRUCTION

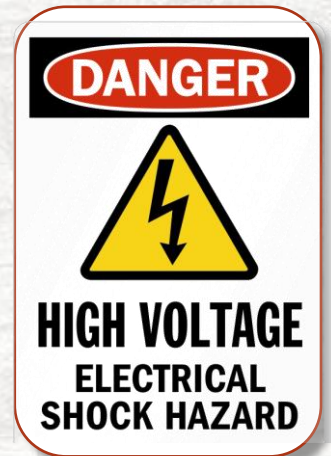
General Safety  
Recommendations



Green Panel on White

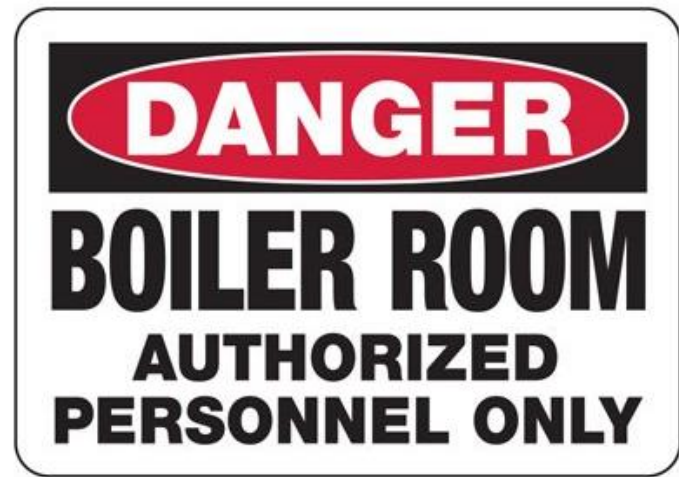
## ELECTRICAL & FIRE SAFETY

No Standard Format



Often Red on White

# SIGN IT or REDESIGN IT!



NO – DANGER is for likely fatal or likely serious injury hazard



YES – INSTRUCTIONAL sign giving safe lifting instructions



YES – CAUTION Describes a likely non-fatal hazard



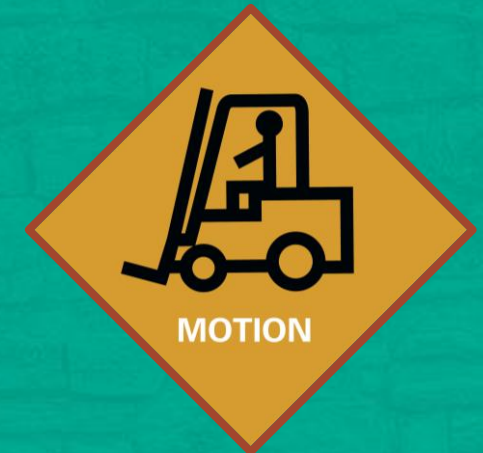
## **Andrew Dagnan**

Environmental and Safety Manager

Wicked Weed Brewing Co.

Asheville, North Carolina

# MATERIAL HANDLING



MANUAL AND MECHANIZED  
MOVEMENT OF MATERIALS

## MATERIAL HANDLING



## HAZARDS

- Lifting/moving heavy objects
- Bending, twisting, turning
- Falling objects
- Lifting, pushing, pulling
- Improperly stacked materials
- Struck-by or caught-in/-between hazards
- Falls, slips, trips, or loss of balance
- Repetitive motion
- Overexertion

## INJURIES

- Sprains, strains, tears
- Soreness and pain
- Bruises and contusions
- Cuts, lacerations, punctures, crushing, and amputations



# ERGONOMIC HAZARDS



# ERGONOMIC HAZARDS STUDY – AT A COLORADO BREWERY

## CONCLUSIONS

- Employees at increased risk for upper extremity (shoulder and wrist) Work-related Musculoskeletal Disorders (WMSDs)
- Employees exposed to combination of ergonomic risk factors
- Survey indicated that 50% of employees felt safety training received was not adequate and safety procedures in place don't work



## TYPICAL HEAVY OBJECTS

- Case of Beer – 30 lb.+
- Hop Box – 44 lb.
- Malt Bag – 50/55 lb.
- Keg (1/6 bbl) – 55 lb.
- Keg (1/2 bbl) – 160 lb.
- Full Barrel – 500 lb.+
- Brewing Hoses – can be very heavy
- Various Others – packaging change-over parts, waste or recycling containers



## LIFTING HAZARD CONTROLS

- **Reduce / Eliminate lifts**
  - Automate processes
  - Keg Vacuum Lift or Robot
  - Hoists / lifts
  - Bulk (silos, super sacks)
- **Two-person lifts**
- **Training on proper lifting**
- **Redesign tools / areas within appropriate heights**
  - Above knees, below shoulders
- **Rotate employees**
- **Encourage micro breaks**



## MATERIAL HANDLING EQUIPMENT



# ADVANTAGES OVER MANUAL MATERIAL HANDLING

- **Lower Cost of Labor**
  - Higher Efficiency
  - Capital Expense is Greater
- **Mechanized Material Handling**
  - Adds its own new hazards
  - Extra Certification / Training
- **Other Advantages**
  - Fewer Injuries
  - Lower Workers Comp Premium
  - Increased Productivity

# “ROLL OUT THE BARREL” – EQUIPMENT EXAMPLES



# “KEG PARTY!” – EQUIPMENT EXAMPLES



# STILL MORE EQUIPMENT EXAMPLES





# MATERIAL HANDLER SAFETY BASICS



- **Check capacity plate – Never overload**
- **Protective footwear**
- **Inspect before use**
  - Look for cracks or other defects
  - Ensure wheels are in good condition
- **Check floor for ruts, bumps, imperfections**
- **If view is obstructed, have a spotter assist**
- **Not for human transportation**
- **When going down an incline, push, don't pull**
- **Hand Truck – Place load over axle – the operator should only balance and push**

# POWERED INDUSTRIAL TRUCKS (PITs)



- PIT
  - Mobile
  - Power-propelled truck
  - Can carry, push, pull, lift, stack materials
- Includes
  - Forklifts
  - Powered Stackers
  - Powered Pallet Jacks



# P.I.T. “CRASH COURSE” – NO, DON’T CRASH!

## MUST DO

- Written Program
- Training Documentation
- Inspections
  - Daily
  - Shiftly
- Packaging Beer

## YES, DO

- Seat Belt, Horn, Lights, Backup Alarm, Safety Glasses
- Loads within Capacity, Low and Centered
- Forks
  - <6” operating
  - On the floor when parked

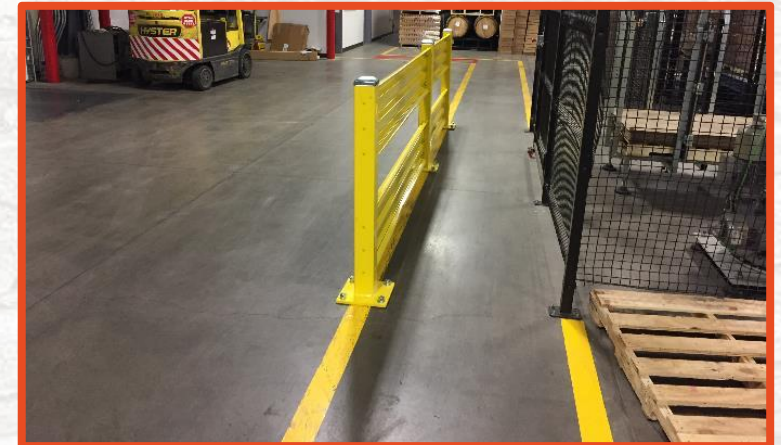
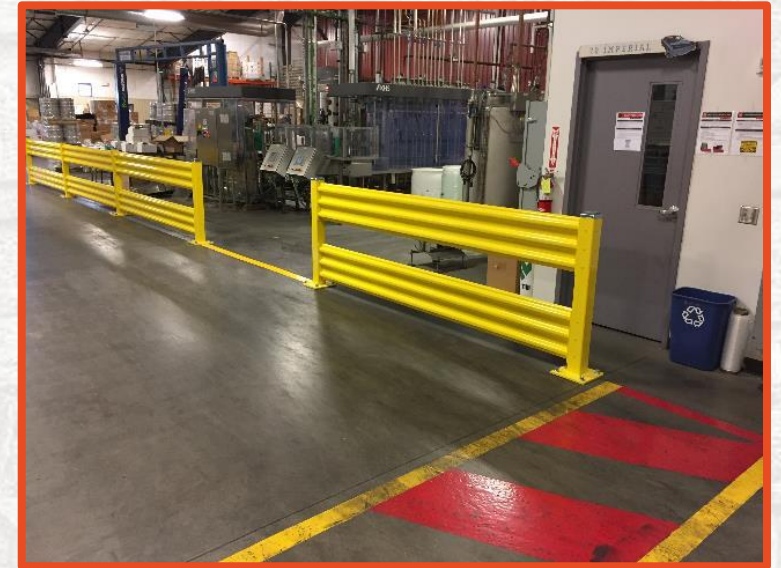
## SWPs

- Hands inside the Cage
- Travel at Appropriate Speeds
- Anticipate Pedestrians
  - Make eye contact
  - No mirrored eyewear
  - Use traffic mirrors
- In and Out Carefully
- Replace Pallets

# P.I.T. “CRASH COURSE” – NO, DON’T CRASH!

## SEPARATE

- PITs from Pedestrians
- Indicate On
  - Floors
  - Wall Signs
  - Barricades
- Protect With
  - Bollards
  - Dock Boards
  - Wheel Chocks



# TRAINING REQUIREMENTS



## REQUIRED TRAINING

- **PITs**
  - Before Use
  - Every 3 years
  - Re-training in certain cases
- **CRAINS/HOISTS**
  - Before First Use
  - Annual Refresher

## RECOMMENDED TRAINING

- **GENL MATL HANDLING**
  - How to Recognize / Avoid Material Handling Hazards
- **HAND TRUCKS, PALLET JACKS**
  - Before Use
- **BACK SAFETY**



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## **Chris Bogdanoff**

Head Brewer & BA Safety Subcommittee Chair

Heroes Restaurant and Brewery

Anaheim, California



# CHEMICAL HAZARDS



SAFETY DATA SHEETS AND PERSONAL  
PROTECTIVE EQUIPMENT



# CHEMICAL USAGE HAZARD ANALYSIS

## TASKS

- Routine cleaning and sanitizing
- Brewing and filtering operations
- SS passivation
- Draught line cleaning
- Lab assays
- Shipping/receiving and warehousing
- Maintenance projects

## OUTCOMES

- Skin, eye damage
- Respiratory distress
- Damage to brewery equip.
- Beer contamination
- Slippery surfaces

## CONTROLS

- Substitution and Elimination
- Good housekeeping
- SWP – caution
- Maintaining SDSs, labels, signs, and placards
- Proper PPE use, selection, inspection, replacement

# CHEMICALS IN BREWERIES/PUBS

1

## CORROSIVES

- Acid Cleaners
- Caustic Cleaners
- Alkaline Powders

2

## OXIDIZERS

- Hydrogen Peroxide
- Peracetic Acid
- Nitric Acid / Iodine
- Ozone
- Chlorine Dioxide

3

## OTHER BEER PRODUCTION

- Non-Oxidizing Sanitizers (Quats)
- Glycol Coolant
- Lab Reagents
- Water Treatment
- Filter Aids
- Glues

# 4

## ASPHYXIANTS

- **SIMPLE**
  - Carbon Dioxide
  - Nitrogen
- **CHEMICAL**
  - Carbon Monoxide
- **OXYGEN**
  - Ambient: 20.9%
  - Deficient: <19.5%
  - Enriched: >23%

# 5

## FLAMMABLES

- Alcohols
- Propane
- Natural Gas
- Lab Reagents

# 6

## FACILITIES CHEMICALS

- Lubricants
- Paints
- Janitorial
- Pest Control
- Food Service

# SAFE WORK PRACTICES – ATTENTIONING THE HAZARDS

## HOUSEKEEPING



- Keep Labels Visible
- Keep Clear Pathways
- Put Away Equipment

## WALKING, WORKING AND EXITING



- Avoid Spills
- Rehearse Emergency Procedures

## HYGIENE



- Wash PPE and Hands After Chemical Use

# ENGINEERING CONTROLS FOR BREWERY CHEMICALS



**Secondary  
Containment**



**Chemically  
Compatible  
Equipment**



**Ventilation and  
Monitoring**

# ADMINISTRATIVE CONTROLS FOR BREWERY CHEMICALS

## SDS

**Safety Data Sheet**  
Chemical Company, Inc.

Revision Date: 02-Jul-2018

**1. PRODUCT AND COMPANY IDENTIFICATION**

Product Identifier: **CAUSTIC CLEANER FP**  
 Product Name: 3189  
 Recommended Use: Cleaning agent  
 Uses Advised Against: For Industrial and Institutional Use Only  
 Manufacturer/Supplier:

24 Hour Emergency Phone Numbers:  
 Medical Emergency/Information: 888-314-6171  
 Transportation/Spill/Leak: CHEMTREC 800-424-9300

**2. HAZARDS IDENTIFICATION**

GHS Classification  
 Skin Corrosion/Irritation: Category 1 Sub-category A  
 Serious Eye Damage/Eye Irritation: Category 1  
 Corrosive to Metals: Category 1

GHS Label Elements  
 Signal Word: **Danger**  
 Symbols:

Hazard Statements:  
 Causes severe skin burns and may be corrosive to metals.

Precautionary Statements:  
 Do not breathe mist, vapors or spray. Wash hands and any exposed skin thoroughly after handling. Wear protective gloves. Wear eye / face protection. Wear protective clothing. Keep in original or other corrosion resistant container. IMMEDIATELY CALL A POISON CENTER.

Response:  
 -Eyes: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
 -Skin: IF ON SKIN (or hair): Take off contaminated clothing. Wash thoroughly with soap and water. If irritation occurs, see a doctor. IF SWALLOWED: Rinse mouth. Do not induce vomiting. See a doctor.  
 -Inhalation: IF INHALED: Remove victim to fresh air. If breathing is difficult, call a doctor.  
 -Ingestion: IF SWALLOWED: Rinse mouth. Do not induce vomiting. See a doctor.  
 -Specific Treatment:  
 See Safety Data Sheet Section 8.  
 Spill:  
 Absorb spillage to prevent environmental release. Store locked up. Store in original container.

## LABEL

**CAUSTIC CLEANER FP**

SIGNAL WORD  
 **DANGER**  **WARNING**

HAZARD STATEMENT(S)  
 Causes severe skin burns and serious eye damage. May be corrosive to metals.

PRECAUTIONARY STATEMENT(S)  
 Do not breathe mist, vapors or spray. Wash hands and any exposed skin thoroughly after handling. Wear protective gloves. Wear eye / face protection. Wear protective clothing. Keep in original or other corrosion resistant container. IMMEDIATELY CALL A POISON CENTER.

SUPPLIER INFORMATION  
 NAME: Spartan Chemical Co. 800-537-8990  
 ADDRESS: 1110 Spartan Drive, Maumee, Ohio 43537 USA

## SIGNS



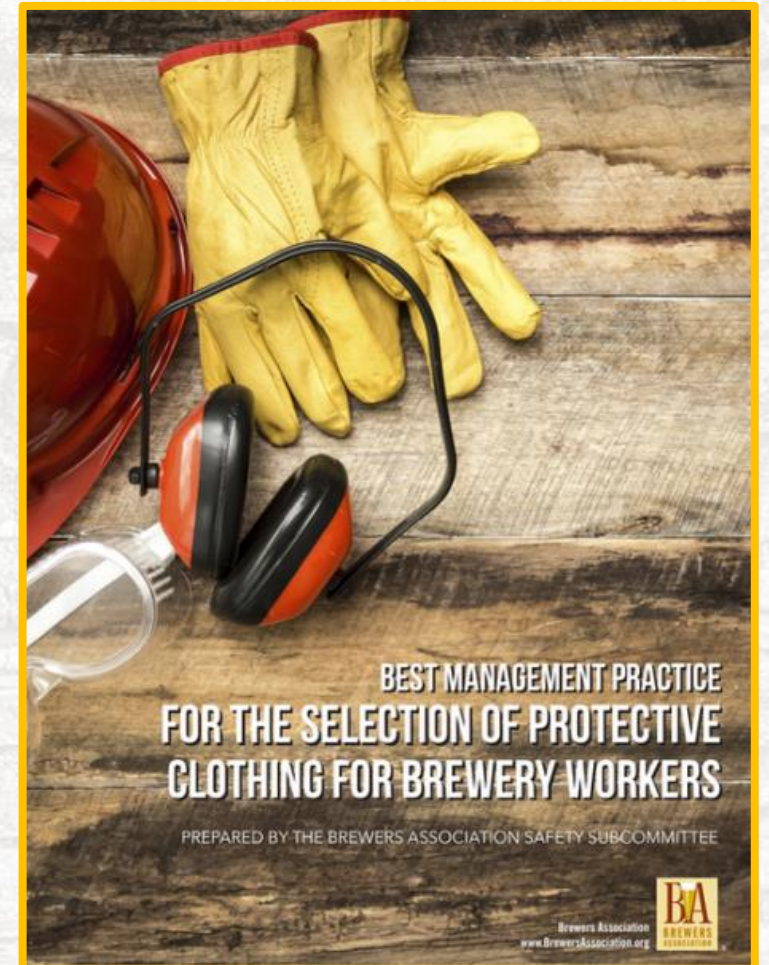
## PLACARDS



# PPE

## LIMITATIONS

- NOT Failsafe
- Last Line of Defense
- Poor Understanding
  - Selection
  - Use
  - Cleaning
  - Inspection
  - Replacement



# EYE PROTECTION

## FROM SPLASHES

- Standard Safety Glasses
- Indirect Vented Goggles
- Face Shield



Indirect Vented Goggles



Direct Vented Goggles





# HAND PROTECTION

## FROM DIRECT CONTACT

- Inexpensive disposable nitrile
- Neoprene hybrid over woven or latex base
- Heavy duty reusable nitrile

Nitrile Disposable  
Low hazard use

Neoprene Hybrid  
Mod hazard use



Heavy Nitrile  
Acids, Bases, Sanitizers  
Mod/High hazard use

# FOOT PROTECTION

## FROM SPILLS, PUDDLES, CONTAINER WEIGHT

- Sturdy leather or synthetic work shoes/boots with reinforced toe and shank
- Knee-high rubber (PVC) with reinforced toe and shank
- Low-rise rubber (PVC) with reinforced toe and shank or rubber pullover over sturdy work boot



# OTHER PROTECTION

## VARIOUS HAZARDS

- Splash protection apron
- Fall protection harness, lanyard, and anchoring
- Hearing protection, disposable or reusable



# RESPIRATORY PROTECTION

None of These Work in the  
Absence of Sufficient Oxygen!!

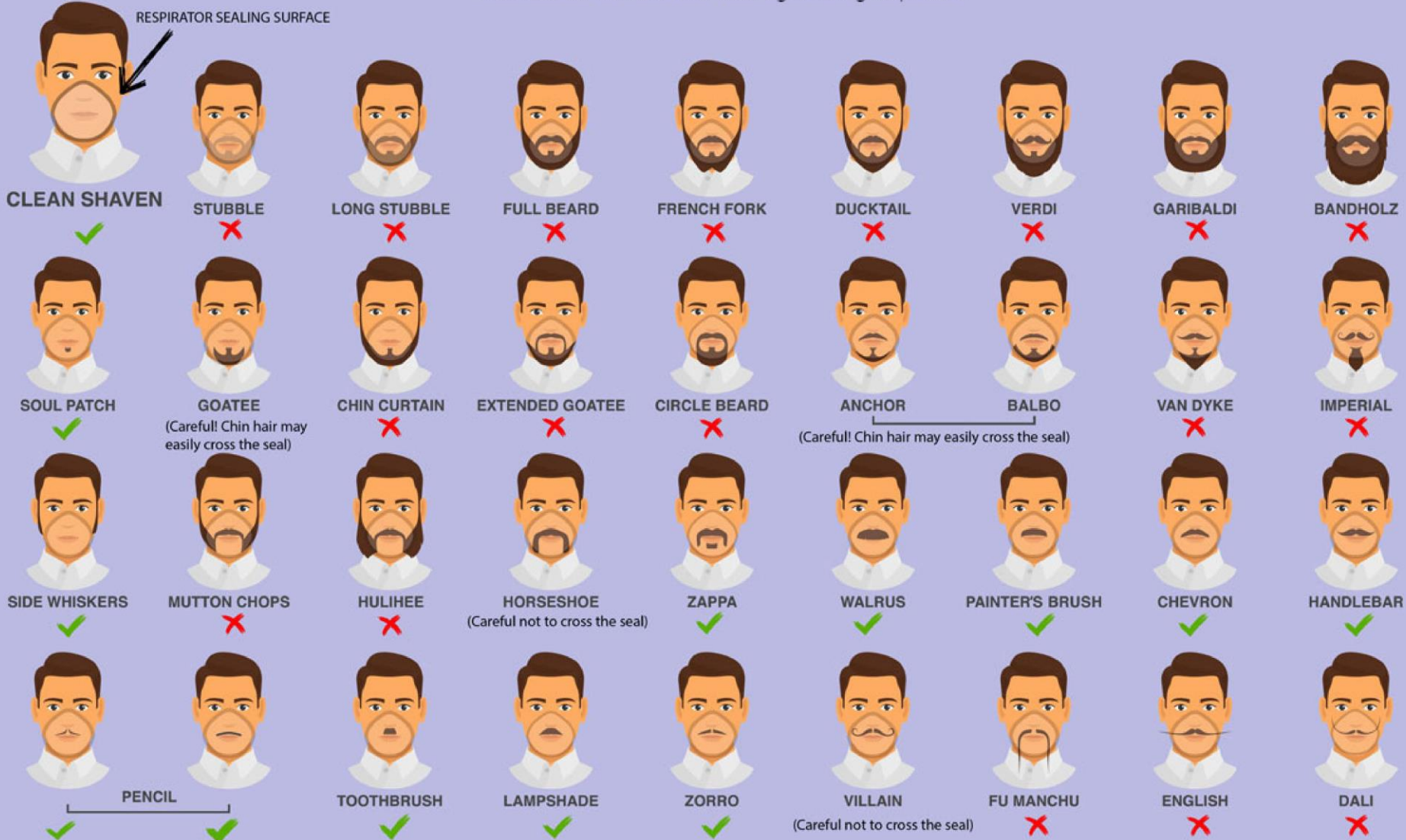
## FROM DUSTS, MISTS, VAPORS, AEROSOLS

- **Chemical Mists/Vapors**
  - Brewery Washdown
  - Paints, Coatings, Solvents
- **Particulate protection**
  - Grain Dust
  - DE Filter Aids
  - Metal, Wood, Plastic Fabrication/Welding



# Facial Hairstyles and Filtering Facepiece Respirators

Intended for workers who wear tight-fitting respirators



## SOME FACIAL HAIR STYLES CAN BE USED WITH ½-FACE RESPIRATORS

- Respirator surface contact area must be 100% against clean shaven skin
- Only disposable dust masks can be worn without fit testing, medical evaluation, and special training