BREWERY SAFETY GUIDE

A guide for brewery safety program development and protecting the health and safety of brewery employees

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Introduction

Managing the health and safety of all brewery employees is just as important as having a gold medal-winning beer. And like the creation of a gold medal-winning beer, an effective health and safety program requires effort, practice, and a certain skill set. As with learning how to brew that world-class beer, development and implementation of an effective health and safety program requires an understanding of what it should look like when it’s finished.

The Brewery Insurance Program is invested in providing information that will help you evaluate the status of your existing brewery health and safety practices, plan an improvement, or begin first-time implementation of your safety program. Providing a safe and healthful workplace is a cost of doing business that cannot be avoided – being proactive with worker safety and protecting the facility/equipment should be among your highest priorities to keep the cost low and your employees productive.

Where do you start? What is required for OSHA compliance? Are there hazards in my brewery that I don’t know about? What if I don’t have a written safety program?

The Brewery Insurance Program is experienced in providing answers to these questions to the craft brewing industry. Whether your brewery is just a few employees and a few thousand barrels per year, or if you’ve had some real success and expansion and you’re making tens of thousands of barrels per year with dozens of employees, you need the same basic program elements.

We hope you find this resource educational and useful. We would be happy to help you with any questions or to assist in the implementation of your safety program. To contact us you can call (855) 273-9467 or email John Hoefer at: john@breweryinsuranceprogram.com.

Special Thanks to the Author

This program was developed by Dan Drown for the Brewery Insurance Program. Dan Drown, CIH, CSP, has 28 years of broad-based U.S. and international experience in occupational safety and health, industrial hygiene, auditing, safety and environmental management systems. Mr. Drown provides environmental safety and health consulting services to a diverse global client group including Fortune 100 clients in the chemical, pharmaceutical, biotech, power generation, oil and petrochemical sectors. Dan has been a homebrewer for 20 years and is passionate about working with San Diego area craft brewers to implement their safety programs.
Section 1 - General Program Requirements

Injury and illness prevention program (IIPP)

The injury and illness prevention program is an umbrella document that describes the brewery’s safety and health program and system. It lays out what will be done, by whom and how, or how often. Many companies like to include a policy statement or description of the commitment that their brewery has to employee safety and health.

Policy statements typically include putting safety before production, commitment to maintaining a workplace free of mechanical and physical hazards, commitment to employee education and training, and a statement of compliance with regulatory requirements and best practices. Some breweries draft a policy and use it in outward-facing communication. Placement occurs in websites or as a posting in the place of business where customers, investors, and business partners can see it along with the gold, silver, and bronze medals.

The IIPP has eight elements that are intended to provide a basic brewery safety program. Every employer in the state of California is required to develop and implement an effective IIPP—for breweries outside of California, this requirement will be coming from Federal OSHA in the next few years so you’re best off starting now. To be effective, the IIPP must fully involve all employees, supervisors, and management. It must identify the specific brewery hazards employees are exposed to and correct these identified hazards in an appropriate and timely manner. It will establish the means of maintaining compliance and communication on the topic of safety and health and will ensure that employees have adequate training and instruction to do their jobs safely. The IIPP and its associated procedures, forms, and other elements must be thoroughly documented.

Assignment of Responsibilities

Safety programs and procedures do not implement and maintain themselves. They require regular, focused effort from management and employees and must be reviewed periodically to ensure that they have kept pace with changes in the business and regulatory climate.
Primary responsibility is given to an individual who will be designated by management as responsible for implementation of the safety program. This individual can be any employee but must be recognized as having the authority to implement the safety program, provide safety leadership to supervisors, and have the knowledge to understand the IIPP requirements and how they pertain to the brewery. Employees need to know who this person is and have access to this person. The brewery operations manager or head brewer are good choices for this designation.

Supervisors must familiarize themselves with the safety and health hazards to which employees under their immediate direction and control may be exposed. They provide a primary link in the chain of communication from management to the production floor. Supervisors should receive safety and health related training equivalent to their assigned work group.

Individual employees: All full-time, part-time, and temporary brewery employees will be apprised of the requirements of the IIPP upon initial assignment and when there have been any changes affecting their safety. Workers must follow the safety procedures and rules as a condition of employment and are encouraged to participate in the safety program by asking questions or bringing at-risk conditions or activities to the attention of management.

Compliance Assurance

Every safety program must include a system for ensuring that employees comply with safe and healthy work practices. Training and retraining should be provided to ensure that employees understand requirements. Brewery management is encouraged to have a recognition program to identify and reward those employees who follow safe and healthful work practices, and adhere to brewery work rules. Disciplinary action, up to and including the possibility of termination, should be clearly detailed in the safety manual but is not recommended as the primary means of safety and health coaching.
Communication

It is important and required to have a method or methods available to communicate with employees in a form readily understandable to them on matters relating to safety and health in the workplace. Provision for communication must be made such that it can be a dialogue and is not just from management to the workforce. Employees should be encouraged to inform the management of hazards encountered in the brewery without fear of reprisal. Effective communication techniques can be meetings, training programs, postings, written communications and a system of anonymous notification such as a safety suggestion box. Some breweries may choose to develop a safety committee. Although not required by law, providing instruction in languages other than English may prove effective in breweries where English is a second language to workers.

Hazard Identification and Evaluation

Hazard identification and evaluation should be used to detect hazards and determine whether or not adequate controls have been put in place to protect employees. The means of identification and evaluation must consider the introduction of new substances, processes, procedures or equipment and consider the possibility of new or previously unrecognized hazards. This inspection process should be documented.

Inspections: Planned reviews of the work areas should be performed and documented, preferably using a checklist or other guide to ensure consistency. Employees responsible for conducting inspections should have training on brewer ysafety requirements.
Hazard recognition: Employees responsible for conducting hazard reviews in the various areas of the brewery should have training and/or experience in identifying hazards in those areas. Formally training employees on hazard recognition is strongly recommended but not required.

Hierarchy of controls: Three main categories of controls are recognized by OSHA. Engineering controls are the most desirable and eliminate hazards by developing barriers or means of isolation such that employees do not have contact. Administrative controls are work rules designed to educate employees on how to avoid specific hazards. The final control is the use of personal protective equipment, which is considered a last resort.

Signs and warnings: Use of standardized wording and symbols, often combined with color, can help raise employee awareness of certain hazards. Some signage is mandatory and will be discussed in later sections of this manual. Other signage is considered advisory and, while optional, is strongly recommended.

Housekeeping: Every brewery, regardless of good intentions, has the propensity to become disordered or generate trash and waste. While housekeeping is not mandated, maintaining the brewery in order is clearly recognizable as a preventive feature to avoid slips, trips, falls, and other injuries. Collecting old equipment and bargain purchases for future
projects is common in smaller breweries but should be managed so as not to create hazards.

Corrective actions: If a condition or item has been discovered or reported that requires corrective action, a system must be in place to capture this action item and ensure that it is completed in a timely manner. A system can be a written list or a spreadsheet, but it must be updated, documented, and acted upon in a timely manner.
Accident/Exposure Investigation

Even with the best safety programs, training, and conscientious employees, incidents will occur and must be recorded appropriately. A method of investigation must be implemented that is able to determine the cause(s) of accidents, hazardous substance exposures, and near misses. A system must be in place to ensure that effective corrective actions are being taken in a timely manner, including prioritization based on the severity of the hazard.

Injury Reporting

Employees must be informed that reporting injuries immediately is required, and it must also be clear that there should be no fear of reprisal for reporting an injury. Getting proper medical care for the injured individual is the primary driver, followed by the need to correct conditions or actions that led to the injury. It is just as important to report property damage as it is to report injuries. Conditions or activities that lead to property damage in the brewery are often just one step away from causing injury. Property damage hurts profitability.
Procedures for Correcting Unsafe/Unhealthy Conditions

As previously mentioned, there is a requirement that all employees should be able to report unsafe or unhealthy conditions. This procedure should be formalized in writing if there are more than 10 employees in the brewery. The means of communication used to report the condition, activity, near miss, or first aid injury need to be included, as well as the plans to implement the corrective action and report results back to employees.

Training and Instruction

The brewery should provide an effective safety training and instruction program to adequately educate employees and supervisors on general safe work practices and on the hazards specific to their job assignments and work tasks. In breweries with more than 10 employees, it is important (and required) to document all safety-related training. The effectiveness of training should be evaluated to determine whether or not it increases employee and supervisor understanding of brewery hazards and can be shown to improve their safe and healthful work practices.

Recordkeeping

A commonly used expression, “If it’s not in writing, you didn’t do it,” applies in the case of key areas of the injury and illness prevention program. Throughout this guide, the elements of the safety program that must be documented will be noted. These are minimum requirements, and employers may choose to document more of the details of the program. Key points of documentation include, but are not limited to:

- Injury and illness prevention program
- Work rules or code of safe practices
- Methods of communication between employees and management on safety topics
- Physical condition tours or inspections
- Accident investigation reports (form 5020 CA)
- The OSHA 300 log (injuries or illnesses meeting recordability criteria)
- The OSHA 300 A – the annual injury/illness summary to be posted
February 1 through April 30 for the prior year.

- Records of training, safety meetings, safety committee meetings, etc.
- Forklift daily inspection records
- Exposure monitoring records and notifications to employees
- Official correspondence between OSHA and the business that is related to compliance inspections and/or citations
- Safety Data Sheets (SDSs) for all chemicals used or stored at the site
- Requirements for specific standards such as The Emergency Action Plan, Hazard Communication, Lockout Tag out, Confined Space Entry, Respiratory Protection, Personal Protective Equipment Assessment, Forklift Operating Instructions, The “OSHA Poster” describing employee rights and provisions of the Occupational Safety and Health Act, and others...

Safety Committees and Meetings

In order to keep safety and health topics refreshed and to communicate changes regarding safety or safety procedures in the workplace, it is necessary to hold safety meetings. Safety meetings are intended for all employees and should be scheduled on a periodic basis as needed to communicate with employees on current safety issues, results of investigations, new procedures, new hazards, or other topics related to safety on the job. Safety meetings can be frequent and short, or less frequent and a little longer in duration. Brewery employees should grow accustomed to safety meetings and expect them to be a normal part of brewery operations.

Safety committees are not required by regulation but are recognized as an effective means for developing dialogue on safety between departments and across the various levels of management and workers at the brewery. Safety committees should have a charter or procedure, and the members should be selected such that a cross-section of the brewery employees is represented. The safety committee should meet regularly, not less than monthly, and at a predetermined time and date that is convenient for all committee members. A formal agenda should be created prior to the meeting and notes taken during the meeting that will later be made available to all employees. Safety committees are helpful in shaping and communicating new policies or procedures and can serve as a pool of participants for incident investigations.
Emergency Action Planning

The emergency action plan must be in writing for all breweries with more than 10 employees. Breweries with 10 or fewer employees may communicate the plan orally, and a written plan is not required to be maintained. In all cases, the employer must review with each employee upon initial assignment those parts of the plan which the employee must know to protect the employee in the event of an emergency. The written emergency action plan must be maintained in the brewery and be available for employee review. Key parts of the action plan must include

- Emergency escape procedures and routes.
- Procedures for employees who may remain to operate or shut down critical brewery operations prior to evacuation.
- A procedure to account for all brewery employees following emergency evacuation.
- Rescue and medical duties (if applicable).
- The preferred means of reporting fires and other emergencies.

It is recommended that the emergency action plan should address medical emergencies, fire, earthquake, workplace violence, and procedures for non-employees who may be present during emergencies.

Medical Services and First Aid

Arrangements should be made in advance with an occupational medicine clinic that is capable of addressing the needs of the brewery. These needs may be pre-employment physicals, respirator user exams, or treatment of occupational injuries.
and illnesses. Professional care should be supplemented by a first aid kit readily available to employees. First aid kits must be inspected frequently and kept clean, stocked, and replenished as necessary. The consulting physician must approve the first aid kit for the brewery to ensure that it has adequate first aid materials (CA requirement).

If the brewery is located within reasonable proximity to a clinic or hospital, is not necessary to train employees in first aid. If employees have had training or wish to lend Good Samaritan assistance to a fellow employee, then this activity is completely voluntary and need not be encouraged or discouraged. It is suggested that when employees need to seek medical attention following a work-related injury, they should be transported by taxi if it is a non-emergency. Emergencies should result in calling 911, and ambulance transport would be used.

**Emergency Shower/Eyewash**

The brewery has corrosive chemicals that could cause serious damage to the eyes or skin, and for this reason, an emergency shower/eyewash should be installed within 10 seconds of travel time between the brew-house and bulk chemical storage areas. In some cases, this may require more than one emergency shower/eyewash. The shower head and eyewash should be aligned so they can be used simultaneously and should have adequate drainage so they can be run frequently to test them and keep fresh water in the pipes. The shower/eyewash is also very useful to help provide first aid in the event of thermal burns.
Incident Investigation

One of the requirements of the IIPP is to have a procedure for investigation of accidents and incidents. OSHA does not specify the method to be used; however, it does require that it gets to root causes and that corrective actions are developed and implemented to prevent recurrence. The steps listed below provide some guidance on how to proceed in an incident investigation.

- An accident/incident is reported
- Secure the scene—make it safe and preserve evidence
- Follow brewery notification procedures for contacting management
- Identify witnesses
- Make observations and collect evidence
- Interview witnesses, employees involved, and knowledgeable persons
- Analyze facts and evidence
- Development an incident statement
- Use root cause analysis
- Identify system deficiencies
- Identify program deficiencies or substandard conditions that can be improved
- Assign recommendations to individuals with estimated completion dates

Accident investigations should be done with the involvement of employees and not just a supervisor filling out form.

ERGONOMICS

In the brewery there is a lot of manual handling and moving of grain, hops, brewer hose, kegs, cases of beer, and packaging materials. An OSHA standard exists in California which addresses injuries that are diagnosed as being caused by repetitive motion. The standard requires a special program to be designed to minimize these injuries if more than one employee has a repetitive motion injury of the same nature in a 12-month period while performing an identical work activity. The details of the ergonomic program requirements are not included in this guide.
Injury and Illness Recordkeeping

**Log and Summary of Occupational Injuries and Illnesses (OSHA 300):** The 300 log is used for classifying occupational injuries and illnesses, and for noting certain aspects of each case. The log shows when the occupational injury or illness occurred, to whom, the regular job title of the injured or ill person, the department in which the person was employed, the nature of the injury or illness, how much time was lost, and whether the case resulted in a fatality. An annual summary and other supplemental 300 forms must also be produced for individual cases. A form 5020(CA) must be filed with the insurance carrier within five days of when the brewery learned of the injury or illness. These records must be maintained for the current year plus 5 previous years. First aid injuries do not need to be logged.

**Partial Exemption for Employers with 10 or Fewer Employees:** If the brewery had 10 or fewer employees at all times during the prior calendar year, is not necessary to keep OSHA injury/illness records unless you have been advised by OSHA that you must do so. These smaller businesses still need to file injury report form 5020 with their insurance carrier.

**Reporting of Serious Injuries and Fatalities:** In California if a serious injury or fatality occurs, notification must be made immediately to the nearest district office of the Division of Occupational Safety and Health. “Immediately” means as soon as possible but not longer than eight hours after the employer learns of the case. A serious case is one that results in hospitalization beyond 24 hours for other than medical observation or in which the employee suffers the loss of any member of the body or any serious degree of permanent disfigurement. Federal OSHA requires reporting of all fatalities or if 3 or more workers are hospitalized. Other states may have different requirements.
Section 2-Critical Programs

Control of Hazardous Energy (Lockout Tag Out)

An important part of any brewery safety program is the control of hazardous energy, also referred to as energy isolation or lockout tag out. During the cleaning, repairing, servicing, setting up or adjusting of machines and equipment, employees must be protected from the unexpected energizing or startup of the equipment. Hazardous energy in the brewery can be in the form of:

- Electrical and mechanical, such as that present in bottling & canning lines or pumps and mills
- Hot water and wort or steam in vessels and piping
- Pressurized gases: carbon dioxide, oxygen, nitrogen, or compressed air
- Chemicals, especially in pressurized systems like clean-in-place (CIP)
- Hydraulic, suspended weights, or other hazardous energy sources
Key terms include:

- **Affected employee:** An individual whose job requires him or her to operate or use machinery or equipment that may be under lockout or tag out or who works in an area where lock-out tag out is performed. Essentially, this will be all brewery employees working in the operations area.

- **Authorized employee:** A qualified individual who locks out or tags out specific machines or equipment in order to clean, repair, service, set up, or adjust that machine or equipment. The key difference between an affected employee and an authorized employee is that the authorized employee will actually apply the lockout.

- **Locked out:** The use of devices, positive methods and procedures that result in effective isolation or securing of hazardous energy sources. As an example, closing a valve can effectively isolate energy, but it is not considered locked out unless a lockout device is applied to the valve, rendering it inoperable. Another example is using a breaker to isolate electrical energy. Until the breaker is secured in a locked position with a lockout device, it is not considered locked out.

A list of equipment should be made with the steps to be taken to lock it out and should be developed for each piece of equipment. Employees who work with or around that equipment must be trained as needed for their role(s) in the lockout tag out program. A simple table or matrix can be used to record this information.

There are some exceptions to the lockout tag out process for equipment that may require dynamic adjustment—in other words, fine-tuning while it is in operation. This is necessary sometimes with bottling machines, cappers, and labelers. In these cases, specific procedures must be developed and the operating controls must be under the sole control of the individual performing this work.

Hazardous energy control procedures must include the following considerations:

- The procedural steps for shutting down the equipment and isolating the hazardous energy
- The procedural steps for the placement, removal and use of lockout and tag out devices
- Steps to be taken to verify that energy has been isolated
• Procedural steps to include the replacement of machine guarding and removal of tools prior to taking the equipment out of lockout
• Description of locks, tags, and equipment used at the brewery for energy isolation

The brewery must have a periodic inspection of energy control procedures, at least annually, to evaluate the continued effectiveness and determine the necessity of updating the written procedures. The periodic inspection must be performed by an authorized employee, and they may not self-audit their own lockout performance. As with all inspection activities, this one must also be documented. If deficiencies are found in the program or the execution of the procedures by certain employees, those individuals should be retrained in the procedures. Keep in mind that brewery expansions can add new equipment or significant changes to existing processes and must be included in this annual review.

Machinery/ Equipment Operation and Guarding

Machinery and equipment must be of adequate design and shall not be used or operated under conditions, speeds, stresses, or loads which endanger employees. In-service machinery and equipment must be inspected and maintained as recommended by the manufacturer and must not be used with defective parts which may create a hazard. Any modifications to equipment or machinery must be made with good engineering practice and may not be inconsistent with the manufacturer’s recommendations or such that employee safety would be compromised.

In this guide it would not be practical to describe each type of equipment and the type of guarding that should be used, but the general rule should be that body parts must be prevented from making contact with hazardous points of operation. Brewery examples include rotating shafts, chains and sprockets, bottle indexers, rotating pressure bottlers, conveyors, cappers, labelers, mills, screw conveyors, pumps, case packers/un-packers, case sealers, pallet stretch wrappers, and others.

Pressure bottling machines must also be provided with an enclosure covering the part of the machine on which the bottle stands while being filled to a point at least 4 inches higher than the top of the bottle. The side of machine facing operator should also be protected by a solid guard.
Permit-Required Confined Spaces

Permit-required confined spaces are likely to be present in all breweries at some point in time. Terminology and practices surrounding confined space entry can seem confusing and complicated at times, but the importance of addressing confined space work appropriately cannot be understated. It is advised that breweries seek the assistance or advice of an occupational safety and health professional when developing their confined space entry program. California OSHA presently has a special emphasis program aimed at evaluating the confined space entry programs in certain industries, including brewing and winemaking. This special emphasis program may result in unannounced inspections by a consultation or compliance health and safety officer from Cal OSHA.

The basic definition of a confined space is one that is large enough for a person’s body to enter, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy. Examples include tanks, grist bins, and grain silos. A permit-required confined space follows the same definition and also has the potential to contain a hazardous atmosphere, a material that can engulf the entrant, sloping or converging walls at the bottom that could trap an entrant, or any other recognized serious safety or health hazard.

The hazards presented in confined spaces in the brewing environment include rakes in the mashtun, carbon dioxide, lack of oxygen, hot surfaces or liquids, cone bottom tanks, CIP and other chemicals, stainless steel welding, and sometimes a combination of these. In some cases, these hazards can be mitigated, which can reclassify a permit-required confined space into a confined space. This is the part of understanding the standard that can become confusing and complicated. The best and safest, although not always the most convenient, method of treating confined spaces is to assume that they are all permit-required confined spaces.

What is a permit? It’s a written document that is used as a checklist to ensure that specific safeguards and procedures have been followed to make a confined space entry safe. Permits tend to look like checklists and have various lines for signatures, acknowledgments and initials demonstrating that certain steps have been taken and that confined space entry is authorized. Permits are issued at the brewery by qualified and trained brewery personnel and must be maintained on file for two years after the permit-required confined space takes place.
The key elements of a confined space entry program include:

- An inventory or detailed description of confined spaces found at the brewery
- A permit form
- Signs warning of the danger of confined space entry and requirement for a permit to be issued
- Means of rescuing an individual from a confined space
- Air testing or atmospheric monitoring equipment to determine the safety of the atmosphere inside of confined spaces
- Training for all individuals involved in confined space entry

Roles

- **Entry supervisor:** A brewery employee, who is trained, qualified, and knowledgeable in the brewery confined space entry program and procedures. The individual must be aware of and understand how to control all hazards associated with confined space entry in the brewery.
- **Qualified entrant:** A brewery employee, who is trained, qualified, and knowledgeable in the brewery confined space entry program and procedures. The individual must be able to safely enter and work in confined spaces.
- **Attendant:** A brewery employee who is trained, qualified, and knowledgeable in the brewery confined space entry program and procedures. The individual is to maintain contact with confined space entrants and initiate the rescue plan in the event of an emergency. The attendant does not enter the confined space to perform rescue under any circumstances.

Procedure

- The qualified individual informs the entry supervisor that a permit-required confined space entry is planned.
- The confined space is open and ventilated continuously to ensure that it has adequate oxygen and that no other atmospheric hazards are present. Forced ventilation may be continued if necessary to ensure safe atmosphere.
- The confined space must be isolated from hazardous forms of energy
following the lockout tag out procedure. This would include blocking hot water, steam from jacketed vessels, lock-out of rakes, screws in live-bottom hoppers, or anything else that could cause an actual or potential hazard.

- The entry supervisor and entrant complete the confined space entry permit, filling in all necessary blanks, including date, time, reason for entry, description of equipment, atmospheric testing results for lower explosive limit (LEL), and oxygen concentration (must be between 19.5% and 23.5%). Airborne combustible dust, if present, must be at a concentration below its lower flammability limit, sometimes also referred to as the minimum exposable concentration.

- The rescue plan is discussed, and necessary arrangements or equipment are put in place.

Note: Confined space rescue is not discussed in detail in this guide.

- Confined space rescue requires special equipment, training, and frequent drills.

- The entrant may enter the confined space when all permit conditions have been met and the entry supervisor authorizes the permit.

- An individual is assigned as an attendant – this person is responsible to monitor the activities and maintain contact with the person in the confined space. This may be accomplished verbally, visually, by radio, or by other suitable means. The attendant is never to leave his or her post or be involved in another activity that could distract attention from monitoring the individual in the confined space.

- If conditions change and a hazard presents itself, the entry supervisor will direct entrants to leave the confined space.

- When confined space activity has been completed, the entry supervisor will close the permit.

The confined space entry program must be audited annually to ensure its effectiveness. The audit is to be performed by an individual trained, qualified and familiar with the brewery’s confined space entry program. The audit consists of reviewing the procedure, inspecting training records of individuals who enter confined spaces, reviewing permits from confined spaces performed in the prior year, and interviewing employees involved in confined space entry.
Powered Industrial Trucks

Forklifts are found in all breweries and scissors lifts in many. Both of these types of equipment are extremely useful but can present hazards if users are not trained to use them properly. Maintenance and daily inspection of powered industrial trucks is required and must be documented.

Training employees on the use of forklifts and scissors lifts requires the supervision of a person who has the knowledge, training, and experience to train operators and evaluate their competence. Training must not endanger the operation, the trainee and other employees. Training can be done by lecture, discussion, interactive computer learning, videotape, or written material. Practical training and demonstrations followed by evaluation of the operator’s performance should take place in the brewery. The OSHA forklift safe operations rules poster should be displayed in a location where forklift operators can see it regularly.

Ensure that employees are apprised that seat belt wear is mandatory at all times.

Electric forklift charging stations require eyewash in case of exposure to the acid in batteries. They must also be located in a well-ventilated area since hydrogen can be developed during charging and is extremely flammable. Hydrogen is lighter
than air, so ventilation above the charging station is important. Propane-powered forklifts need a fire extinguisher on board. Propane should be stored in a ventilated cage outside with adequate warnings of flammability and “No Smoking.”
Section 3 - Chemical Management

Hazard Communication

The name “hazard communication” is a good description of this OSHA standard. It requires that hazardous substances known to be present in the brewery must be inventoried and adequate information made available to inform employees how to work with them safely. Hazard communication, simply stated, is a program to identify chemicals and educate employees on their hazards.

The starting point for a hazard communication in the brewery is to inventory all chemicals. While performing the inventory, the effectiveness of the labels should be evaluated. The brewery must maintain a safety data sheet (SDS) for each chemical or hazardous substance present in the brewery. Finally, brewery employees must be made aware of the types of hazardous chemicals present in the brewery, how to read the labels, and how to find an SDS for a particular chemical—electronic means of storage is acceptable if all employees are able to access it at all times. The elements of this program must be documented in a procedure and employees appropriately trained.

Here are the basic requirements of the program:

- Hazardous substance list – A simple spreadsheet can be used to enter the trade name, chemical name, manufacturer, and hazard classification(s).
- Labels – Any written, printed, or graphic material displayed on containers of hazardous substances. All containers must be labeled by common name or chemical name and bear the appropriate hazard warnings – Corrosive, Flammable, Irritant, etc.
- Safety Data Sheets (SDS) – Written or printed informational material concerning hazardous substances which is prepared in accordance with hazard communication requirements by the chemical manufacturer or distributor. SDS can be 3-hole punched and added to a binder as they are received. The preferred way to store SDS is to maintain an index with reference to the chemical name, the name it is referred to in the brewery, and any other names that are familiar to employees. If SDS are sequentially numbered, they are easier to find in a binder than if
they are alphabetized. The SDS index should be updated frequently to include all new SDS added to the binder. Some breweries prefer to use electronic copies of SDS that have been scanned or received from the manufacturer/distributor of the chemical by e-mail or from their website.

Training on the written procedure must include information on the prior three bullets, methods the brewery uses to inform employees of the hazards of non-routine tasks, methods used to protect employees from chemicals during normal operating conditions and foreseeable emergencies, and how to manage contractor chemical safety and contractor chemicals.

The Hazard Communication Standard has been updated and changes went into effect in late 2013. Most noticeable is the following warning label scheme. The standard took steps toward global harmonization and is often referred to as GHS (Globally Harmonized Standard). With global commerce, a common internationally accepted warning label and SDS format was adopted by Federal OSHA. Complete phase in will be in the next couple of years but employees now need to be made aware of the warning labels symbols and meanings and standard SDS format.
<table>
<thead>
<tr>
<th>Hazard Symbols</th>
<th>(to be used in pictograms for substances of the particular class)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLAME OVER CIRCLE—USED FOR THESE CLASSES:</strong></td>
<td><strong>FLAME—USED FOR THESE CLASSES:</strong></td>
</tr>
<tr>
<td>• Oxidizers</td>
<td>• Flammables</td>
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<td>• Self-Heating</td>
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<td>• Emits Flammable Gas</td>
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<td>• Organic Peroxides</td>
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<td><strong>SKULL AND CROSSBONES—USED FOR THESE CLASSES:</strong></td>
<td><strong>CORROSION—USED FOR THESE CLASSES:</strong></td>
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<td>• Acute toxicity (severe)</td>
<td>• Corrosives</td>
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<td><strong>HEALTH HAZARD—USED FOR THESE CLASSES:</strong></td>
<td><strong>ENVIRONMENTAL HAZARD—USED FOR THESE CLASSES:</strong></td>
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<td>• Carcinogen</td>
<td>• Environmental Toxicity</td>
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<td>• Respiratory Sensitizer</td>
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<td>• Aspiration Toxicity</td>
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Typical Brewery Chemicals

Breweries use a variety of chemicals to maintain cleanliness in brewing equipment. Some are cleaners, and some are sanitizers. Caustic (high-pH) and acids (low-pH) are present in either full-strength or in diluted proprietary blends to perform clean in place (CIP) procedures for vessels and equipment. These materials are corrosive to human tissue and can cause serious injury following contact if they are not rinsed off immediately. Some of the high-pH (caustic) corrosive chemicals typically found in breweries include: potassium hydroxide, sodium hydroxide, and sodium hypochlorite. Some of the low-pH (acidic) corrosive chemicals typically found in breweries include phosphoric acid, nitric acid, iodophor, and peracetic acid.

Flammable liquids are found in breweries and may be blends of isopropyl alcohol under various trade names. These products are used to sanitize various parts often during pipe or equipment assembly with tri-clamp connections. Other flammables may be found in aerosol cans in the maintenance area or shop along with combustible gearbox oil, lubricants and other small quantities of over-the-counter maintenance fluids.

Small quantities of chemicals may be found in brewery laboratory areas where yeast cultures are transferred or where quality control samples are processed. Each lab should be evaluated to ensure that the hazards are understood and safe work procedures are developed.

Gas Systems

No brewery is complete without a carbon dioxide (CO$_2$) system. Aside from the CO$_2$-naturally produced in fermentation, a house system will be put in place to aid in carbonation in brite tanks, keging, purging of fermentation vessels and kegs, and pushing beer from kegs for serving at tasting bars. Some breweries will have nitrogen systems used in bottling and/or dispensing. Take special care to ensure that these gas systems are maintained without leaks, and if they are plumbed into a poorly ventilated space such as a cold room, an oxygen and/or CO$_2$ monitor with alarm is highly recommended.
Oxygen is usually introduced to the transfer line after the heat exchanger between the brew-house and the cellar and provides a jump-start for yeast after the initial pitching. In small and medium-sized breweries, the oxygen system will be a cylinder or series of cylinders with a tie-in point just past the heat exchanger. Care must be taken not to introduce grease or oil into any plumbing attached to the oxygen system. A common misconception is that oxygen is flammable – it is not. However, it does vigorously improve combustion and, in contact with certain materials, can spontaneously ignite a fire. Oxygen should not be stored near anything flammable or combustible, especially acetylene or propane tanks.

Gas systems can be of particular concern when they are plumbed into areas where confined space entry may take place, so it is important to be aware of their presence when preparing for confined space work.

Gas cylinders should always be stored upright and fastened to a structure with a noncombustible cable or chain. Multiple cylinders should be restrained at the top and the bottom with two separate chains or cables placed at one-third of the height and two-thirds of the height of the cylinder, respectively. Gases being stored should have their valve caps in place.

**Proposition 65**

Proposition 65, also known as Prop 65, is a California law associated with the words *Chemicals Known to the State to Cause Cancer or Reproductive Toxicity*. Prop 65 does not apply to employers with fewer than 10 employees. Its purpose is to provide a warning to employees before they may be exposed to a chemical listed under Prop 65. All breweries in the State of California should post Prop 65 warning since ethanol (alcohol) is on the Prop 65 list.
A brewery has hazardous materials, and they must be stored appropriately to ensure safety. Every brewery has chemicals that are incompatible and should not be stored together or mixed in their concentrated forms.

- Acids and bases (caustics) should not be stored or used such that they can mix together. Some common methods of mixing chemicals inadvertently include the use of transfer containers from drum to point of use without rinsing the container after each use. Drum pumps are sometimes taken from one drum and placed directly into another without rinsing and cleaning. Drums are sometimes reused without thorough cleaning, and incompatible chemicals are introduced to residues in drums.

- Some sanitizers, when mixed with either a strong acid or a strong base, can release hazardous gases, and for this reason, acids and bases should be kept segregated from each other and from sanitizers.
• Oxygen cylinders should not be stored near flammable gases such as acetylene or propane or stored in the presence of combustibles like packaging materials, grain, or combustible waste such as paper.

• Liquids with the potential to cause harm, such as acids and bases, should be stored on containment pallets or in curbed areas so that if they leak, they will not cause any immediate harm. Containment keeps spilled liquids from spreading, and separate containment pallets or areas keeps them from coming in contact with each other. It is common to see acids and bases stored on the same containment pallet or to have containment pallets stored immediately adjacent to each other. This close storage proximity should be avoided.

• Hazardous substances must be stored in containers which are chemically inert to them. It is a good idea to keep chemicals in their original containers; however, if it is necessary to use smaller or multiple containers for chemical use, the SDS should be consulted or the container manufacture contacted to ensure compatibility.
• Containers of hazardous substances should not be stored in locations where they may be subject to physical damage or deterioration of the container or label. Exposure to vehicle traffic and forklifts should be considered, as well as direct sunlight and weather conditions.

• Extremely hazardous substances should be stored in locked containers; however, these types of materials are rarely found in breweries.

All hazardous substances should be included in the hazard communication program inventory and be properly labeled with a SDS on file.

Personal Protective Equipment

Even though the best efforts in place attempt to engineer hazards out of the brewery, there is still the need for brewery employees to wear personal protective equipment while performing certain tasks. The starting point for a personal protective equipment program is to inventory the tasks that are performed by employees and list the hazards associated with each of them. This hazard assessment is not only a good idea, but is required by OSHA and is often a program element that is found missing during inspections.

Following the hazard assessment, personal protective equipment selections must be made that can effectively mitigate the identified hazards. Consideration needs to be given to ensure that equipment selected fits each affected employee. Where personal protective equipment is required, the brewery is expected to provide it at no cost to the employees. Employees must be trained in the proper use and limitations of personal protective equipment, including how to put it on, take it off, clean it, and store it properly. They must also be apprised of the limitations of personal protective equipment and how to identify when its useful life has ended. A combination of training and signage can be used to inform employees of when personal protective equipment is necessary.
Commonly used personal protective equipment and breweries include:

**Eye and Face Protection**

- **Safety glasses** must meet the requirements of ANSI Z. 87.1 (shatter-resistant lenses and approved integrated side shields). Approved safety eyewear typically has a Z 87 designation molded into the inside of the temple pieces.
  - Safety glasses should be worn in all brewery areas by employees and visitors where there is a hazard of flying objects, such as in bottling operations.
  - Safety glasses are designed to protect the eyes from the impact of flying objects. Safety glasses do not provide adequate protection from chemical splashes.
  - Safety glasses are not adequate protection when handling bulk quantities of liquid chemicals – this is the purpose for goggles.
  - Safety glasses with dark lenses decrease visibility and should not be worn indoors unless they are used as specified for torch cutting or welding.
• **Face shields** must meet the requirements of ANSI Z. 87.1 – 2003.
  ◊ Protection of the face, nose and mouth from splashes of chemicals or flying particles when using power tools.
  ◊ When using a face shield to protect from chemicals, goggles must be worn underneath to provide adequate eye protection.
  ◊ Face shields must be stored properly and kept clean.

• **Goggles** must meet ANSI Z. 87.1 -- 2003 standards and are used for chemical splash protection.
  ◊ Dispensing of bulk chemicals (use indirect venting type)
  ◊ Protection from a splash of hot or hazardous liquids, such as during CIP operations
  ◊ Protection from flying particles when using power tools

**Hand Protection**

• **Heavy-duty impermeable gloves** constructed of nitrile or neoprene should always be present in breweries.
  ◊ Should have a 1-to-2-inch cuff to keep liquids from dripping from the hand and forearm toward the elbow
  ◊ Are used for handling and dispensing bulk chemicals, such as CIP products, acids, and caustics
  ◊ Can provide protection from hot liquids for short periods of time
  ◊ Have some resistance to abrasion and cuts

• **Leather and permeable gloves** of various materials of construction are useful in performing many tasks in the brewery:
  ◊ Can protect hands from minor abrasions and cuts when picking up broken glass or handling construction materials during expansions
  ◊ May be used during some maintenance operations to keep the hands clean
  ◊ May offer some protection from hot surfaces for short periods
  ◊ Do not offer any chemical protection
• **Disposable exam weight gloves** commonly made from nitrile are sometimes used in breweries:
  ◊ Improve grip when packing cases with bottles
  ◊ Do not offer much chemical protection and should not be relied on during bulk transfer of liquid chemicals
  ◊ Sometimes use during maintenance to keep the hands clean
  ◊ Do not offer protection from hot surfaces or cuts and abrasions

**Body Protection**

• **Impermeable aprons** provide protection for the groin, upper legs, and part of the torso and chest from acids, caustics and short-duration splashes of hot liquids.
  ◊ Should hang 6 to 8 inches lower than the tops of boots to avoid funneling splashes into the boots
  ◊ Do not protect arms and underarms
  ◊ Tend to provide protection only to the front of the body

• **Impermeable one- and two-piece overalls** provide full leg and body protection, front and back. They also protect the underarms and groin, which are particularly sensitive areas to chemical and hot liquid splashes.
  ◊ Should not have the legs tucked into boots
  ◊ Must fit appropriately—not too large or too small
  ◊ Zippers and snap closures must be used for protection to be effective
  ◊ Must be cleaned after use and allowed to air-dry

**Foot Protection**

• **Steel toe neoprene boots** are commonly found in breweries in several styles and varieties.
  ◊ Provide protection to the toes from falling objects such as kegs or bottles
  ◊ Offer protection from intrusion by liquids and chemicals
  ◊ Have some slip resistance incorporated into the soles
  ◊ Can increase risk of burns from hot liquids entering the open tops
Hearing Protection

- **Expandable foam earplugs or muffs** are effective for hearing protection during noisy activities such as operating a bottling line or while using power tools.

**A Note on Hearing Conservation:** The OSHA hearing conservation standard is not discussed in this manual. Most small and medium-sized breweries do not operate bottling lines continuously for a full shift and usually bottle only a few days per week. If your bottling line runs continuously for eight hours or more, then employee exposures should be evaluated to see if they meet the thresholds of the hearing conservation standard. If the standard does apply, then employees would need baseline and annual audiometric exams, training on noise exposure and hearing loss, and instructions on how and when to use hearing protection.

Respiratory Protection

The first thing to consider with respiratory protection is to develop controls and procedures such that it’s not necessary. Enclosure of dust-producing operations such as operating mills and use of cleaning chemicals in confined spaces can be engineered out or controlled with administrative procedures. If your brewery hazard assessment still indicates that respiratory protection is necessary, then you need to follow all of the requirements of the respiratory protection program in order to be in compliance. A respiratory protection program administrator will need to be named. This individual must be suitably trained and have adequate knowledge of the respiratory protection standard and the proper use and limitations of respirators used at the brewery. The program requirements are listed below and must be contained in a written program.
• The proper type of NIOSH-approved respirator must be selected based on the type of hazards present. The most commonly seen respirators in breweries are the N-95 dust mask (referred to as a filtering face piece by OSHA). Half-mask cartridge respirators cover the nose and mouth with an elastomeric face piece into which two cartridges are fitted. Finally, the full-face respirator seals around the forehead, both eyes, nose, mouth, and chin. Half-mask and full-face respirators may be fitted with various types of cartridges which can protect the user from dust, acid gases, organic vapors, or a combination of these.

• The tasks for which respirators must be used should be determined by brewery management, and respirator use should be permitted only by those who are medically evaluated, trained, and fit-tested.

• Medical evaluation involves a pulmonary function test, interview/exam by a licensed health care provider or physician, and filling out a questionnaire required by OSHA.

• Brewery employees who are medically cleared for respirator use need to be trained in the proper use, limitations, putting on and taking off, cleaning, and storage of the respirator.

• After employees have been medically evaluated and trained, they are fit-tested using one of several available methods. At this time, their ability to properly put on the respirator and perform a fit check will be evaluated.

• The respiratory protection program administrator must periodically evaluate the program to ensure its effectiveness and document the process.

Respiratory protection is one of the standards with which breweries often have difficulty keeping in compliance. Tasks involving respirator use are usually short in duration, and maintaining a respiratory protection program as required by OSHA takes a fair amount of effort and understanding. The most commonly seen challenges with respirators in breweries include not having a formal program, improper cleaning and storage, use of respirators by individuals with facial hair that interferes with the seal, and not having medical evaluation or fit-testing.
Cold Rooms

Every brewery cold room must have at least one door which can be opened from the inside. Lighting must be provided in the room since windows or other natural light is usually not present. The light switch must be near the door or be an illuminated switch which can be found in the dark. If cold rooms are maintained at or below freezing (32°F or 0°C), then a fire fighter-type axe must be kept in the room near the door. Most cold rooms in breweries are not at or below freezing, so this should not be required.

Carbon Dioxide Safety

Most breweries and brewpubs maintain a walk-in cold room for storage of kegs connected to their draft service system. Carbon dioxide is used to push beer from the kegs to the serving taps and therefore is plumbed or present in cylinders in the cold room. In the event that the carbon dioxide system leaks, there is the possibility that carbon dioxide can be contained in the cold room and present a hazard to employees. Easy-to-install carbon dioxide monitors are available specifically for the purpose of providing warning of elevated carbon dioxide levels in cold rooms of breweries, bars, and other beverage production and storage facilities. With a purchase price of well under $1,000, this is a must-have piece of equipment at any brewery. If nitrogen is used, then consider an oxygen monitor to ensure that the normal sea level concentration of 20.9% oxygen is not reduced to below 19.5%.
Section 4 - Elevated Work

Fall Prevention/Protection

Stairs, Railings, and Platforms

Fixed stairs must be provided for access from one structure level to another for operations that require regular travel between levels and for access to operating platforms at any equipment which requires attention routinely during operations. Fixed stairs must be provided where access to elevations above 4 feet is daily, or needed for purposes such as level checking, inspection, regular maintenance, situations in which there may be exposure to harmful substances, and situations in which the carrying grain and hops or tools and equipment is normally required. Brew-house work platforms should be accessible by stairs and not ladders where possible.

- Fixed stairways must have a minimum usable width of 22 inches and should be installed at angles of between 30 and 50 degrees to the horizontal.
- Each tread and the top landing of the stairway should have a nose which extends 1/2 inch to 1 inch beyond the face of the lower riser.
• Riser height and tread width must be uniform throughout any flight of stairs. Ladders should be used where the rise would exceed 9 1/2 inches and the run would be less than 8 inches.
• All treads must be slip-resistant – especially in areas that are normally wet.
• Stair railings must be provided on the open sides of all exposed stairways and should be between 30 and 38 inches in height.
• City or municipal codes should be consulted to ensure that stairway design meets their requirements.

Work platforms are those areas 4 feet and higher where employees perform tasks on a regular basis and are not simply used as a walkway. Most breweries have work platforms in the brew-house and sometimes in the milling area. These are locations that are frequently accessed by brewers who perform tasks such as adding specialty grain to mills and mash tuns or hops into the kettle. These areas need to have standard hand railings 42 inches in height with a mid-rail approximately halfway between the top rail and toe-board at the bottom. If mash tun or kettle openings and controls are within 6 feet of the top stair, then a self-closing swing gate should be installed to prevent the brewer from backing into the stairway while performing tasks on the platform. Railings are not necessary between the platform and equipment used as long as the placement of that equipment would prevent a fall from the platform.

Fixed and Portable Ladders

Stairways are preferred over ladders; however, the need to access elevated locations for repairs or where stairways do not fit, or are not practical, requires the use of ladders. There are 12 different definitions for types of portable ladders and 6 types of fixed letters mentioned in Cal OSHA general industry standards. Our discussion of ladders will cover the types that are typically found in breweries – fixed vertical ladders and portable extension, straight, and stepladders.

**Fixed ladders** are those permanently attached to a structure, building, or equipment. The basic requirements are as follows:

• The vertical distance of the first rung from the ground level may be as high as 14 inches.
• The minimum clear horizontal length of rungs must be at least 16 inches.
• All rungs must have a minimum diameter of 3/4 of an inch for metal ladders and 1-1/8 inches for wood ladders.
• Rungs must be free of splinters and burrs that could cause hand injury.
• There must be 36 inches of clear space on the climbing side ladder to allow an employee easy access while climbing.
• The distance from the rungs to the nearest permanent object and back of the ladder must be at least 7 inches.
• Ladder side rails must extend at least 30 inches in height above the platform at the top of the ladder if the ladder is used to access a platform.

Employees may not carry equipment or materials which prevents the safe use of ladders. They are required to face the ladder when ascending and descending and must always use both hands when climbing up or down a ladder.

**Portable ladders** must be maintained in good condition at all times, the joint between the steps and side rails must be tight, all hardware and fittings must be securely attached, and the movable parts must operate freely without binding or undue play. Portable ladders must be inspected monthly or more frequently, depending on use, and after any occurrence that could affect their safe use. Damaged ladders must be removed from service.

**Safe Practices for Portable Ladder Use**

• Straight and extension ladders should be firmly footed or tied off. Nonskid pads or boots on ladder feet should be in good condition.
• Stepladders should be fully extended and the hinges locked in place.
• Stepladders should not be used as straight ladders.
• Ladders should not be placed in passageways, doorways, or any location where they may be displaced by activities being conducted – consider forklift traffic.
• Employees should keep their center of mass near the middle of the step or rung and should avoid overreaching on either side.
• Three points of contact should be maintained on ladders at all times – two hands and one foot or two feet and one hand.
• Employees must not carry equipment or materials which prevent the safe use of ladders.

• When ascending or descending a ladder, the user must face the ladder and maintain contact with the ladder at three points at all times.

• If exiting the top of the ladder, the ladder must extend beyond the upper surface by at least 3 feet.

• Employees may not stand or work on the top three rungs of an extension ladder unless protected by a fall arrest system (four-point harness and lanyard tie-off).

• Employees may not sit, kneel, step, or stand on the pail shelf, top cap or the step below the top cap of a stepladder.

• Ladders may not be used for purposes other than which they were intended.

• Planks may not be run between ladders or to another surface for use as a scaffold.

• No more than one person may be on the same ladder at the same time.

**Personal Fall Arrest Systems**

Personal fall arrest systems may need to be used where brewery employees are not protected by standard handrail. Activities that may require this equipment could be non-routine maintenance tasks or repairs that require accessing areas of the brewery that are outside of normal daily activities. The easiest way to comply with this requirement is for the employee to wear a four-point harness with a D ring attachment at the back centered approximately between the shoulders. A four-point harness is one that has individual leg straps and upper body supports such that an employee who falls against it will be suspended in a vertical position. The fall arrest device attaches to the D ring at the back of the harness and is fixed to a structure capable of supporting a 5,000-pound static load. The fall arrest device is typically a steel cable that pays out from a spring-loaded spool and retracts as the pressure of normal movements during work is put against it. In the event of a fall, the device will decelerate and lock in place after no more than 3-1/2 feet of travel.
Harnesses and fall arrest equipment must be inspected regularly by a competent person in accordance with the manufacturer’s recommendations. Inspections must be documented. Employees must be trained in the safe use of fall arrest systems.
Section 5- Significant Programs

Hot Pipes and Hot Surfaces

Breweries have hot surfaces present every day during operations, and most employees have learned or been educated on how to avoid them. OSHA requirements are to insulate or guard against contact from pipes or other exposed surfaces having an external surface temperature of 140°F or higher and located within 7 feet measured vertically from the floor or working level, or 15 inches horizontally from stairways and fixed ladders. The standard does allow an exception to operations with consideration for the nature of the work or where the size or configuration of the hot surfaces makes guarding or insulating impracticable.

Every brewery is set up differently, and there is no single solution to the concern of protecting employees from hot surfaces. Insulation is commonly found on steam lines and as a priority, rightly so, since they are much hotter than other surfaces in the brewing operation. The best solution to managing this hazard is to educate employees, affix warning signs or decals, place barriers such as expanded steel or hand rails, and continually remind employees in safety meetings. When planning
expansions or installation of new equipment, locate transfer piping as much as possible in locations where contact with hot surfaces is less likely. Keep records of minor burns and focus any problem-solving efforts on areas or activities where there is an upward trend of thermal burns.

While on the topic of hot pipes and hot surfaces, there is value in mentioning that brewery employees must understand that immediate first aid for thermal burns is essential in managing burn severity. Use of the emergency shower or eyewash, which is traditionally considered for chemical exposure, should be taken advantage of if an employee suffers a thermal burn. Copious amounts of cool water gently applied to burned skin can reduce the severity or “thickness” of the burn. Of course, in the event of any serious burns, medical treatment should be sought immediately.

**Fire Prevention**

Fire prevention is one of the most basic safety programs in all industries. Pre-fire planning can be simple in a setting like a brewery due to the type of activities performed and materials used and produced. The fire prevention plan should consider the types of flammable, combustible, or ignitable materials present in the brewery as well as potential ignition sources and equipment available to extinguish fires. Fire exits should be no further than 150 feet in buildings not equipped with automatic sprinkler systems or 200 feet in buildings equipped with automatic sprinkler systems. Multiple exits are required from the manufacturing area and should be labeled. These exits may not be blocked at any time or locked from the inside during normal business hours.

Tobacco smoking is essentially banned in all workplaces and public buildings, so this is no longer an issue that needs much management. Other ignition sources in the brewery include the use of welding equipment and torches, grinders and other abrasive tools and, in some breweries, direct-fired kettles. Electrical systems are another common cause of industrial fire and should be maintained to code standards. Construction and expansion activity is a time when particular care must be taken to control ignition sources since increased use of power tools and welding, coupled with typical construction debris, can provide fuel and ignition.

Combustible materials such as cardboard, plastic wrap, pallets, specialty grain bags, labels and packaging materials should be stored in an orderly fashion and care taken not to perform ignition generating activities near their storage areas. Flammable
liquids should be stored in a flammable liquid locker with self-closing doors that meets local fire department requirements. Small quantities of flammable liquids may be exempted by the local authorities or regulations. Typically, local fire department representatives will periodically visit all manufacturing companies to perform inspections and will provide advice on fire prevention planning.

**Portable Fire Extinguishers:** Requirement for fire extinguishers is driven partly by OSHA and partly by local fire authorities. Once the threshold has been crossed and it has been decided that the brewery will have fire extinguishers, then all of the requirements of the portable fire extinguisher standards apply.

- Fire extinguishers must be mounted and located so that they are readily available to employees without subjecting employees to possible injury. This simply means that extinguishers must be easy to reach if needed.
- Extinguishers must be approved and selected based on the anticipated class of fire that might occur in the brewery. Class A is a fire involving combustibles like wood, cardboard, or paper; Class B includes flammable liquid fires; Class C fires involve electrical equipment. Most dry chemical fire extinguishers are Class A, B, and C.
- Employees must be trained to understand their limitations in using a fire extinguisher and that they are only for incipient-stage fires. Basic instruction in fire extinguisher use should be provided to all employees with the understanding that employees will call the fire department before attempting to extinguish a fire and that they will not put themselves at risk.
- Extinguishers must be inspected and maintained. Monthly visual inspections are required and must be documented – usually on a tag on the fire extinguisher. An annual maintenance check should be performed by a qualified contractor. Most extinguishers also need to be hydrostatically tested every five years. Extinguishers found to be damaged or in need of maintenance must be taken out of service.

**Sprinkler Systems:** All fire protection equipment, materials and assemblies must be maintained in proper operating condition, and periodic inspections and tests must be made to assure this. Local fire department requirements can vary, but some basic rules to consider include:
• Maintaining sprinkler water supply valves in a locked open position.
• Stacking materials no higher than 18 inches below sprinkler heads.
• Not using sprinkler heads or sprinkler piping to support other pipe, conduit, or wiring.
• Maintaining clear access to sprinkler control valve manifolds and gauges.

Property insurance providers are usually very eager to assist you in managing your fixed fire suppression systems.

Pressure Vessels/Systems

Air tanks or receivers may be present in the brewery to maintain pressure in a compressed air system. All air tanks with a volume greater than 1 1/2 cubic feet that have safety valves set to open at 150 PSI or higher must have operating permits. Air tanks below these thresholds still need to comply with Unfired Pressure Vessel Safety Orders.

• Each air tank must be protected by one or more safety relief valves that meet ASME Boiler and Pressure Vessel Code requirements and must be installed so that they cannot be rendered inoperative, such as being isolated from the air tank by another valve.
• Relief valves must be sized and rated appropriately for the tank that they are protecting and must relieve in a direction that is safe for employees.
• Air tanks should not be operated such that the relief valves are opening frequently - this is an indication of some problem that needs resolution.
• Air tanks should not be located in corrosive atmospheres or standing liquids.
• Air tanks must be maintained as required by the manufacturer’s instructions.

Vessels/tanks and kegs are under pressure of varying degrees throughout the brewing, cellaring, and packaging process. All fermentation vessels and brite tanks should have pressure relief either on the tank or on piping associated with certain activities such as CIP. Keg wash equipment should also be designed and equipped with pressure relief devices. Commercially produced units are likely to have pressure
relief but should be verified nonetheless. Most pressure bottling machines also have pressure relief valves.

Gas systems used to dispense beer have their pressure regulated either by a regulator in line from a bulk tank or a regulator attached directly to gas cylinders. Most kegs used in the US now come with Sanke fittings, which rely on the Sanke tap for pressure relief. This is not normally a concern since the kegs are built to withstand several hundred PSI and their maximum working pressure is around 60 PSI. It is important to note that when the tap has been removed from the Sanke keg, it no longer has pressure relief. The Cornelius keg is still in use in some craft breweries, but is rapidly disappearing due to the popularity of Sanke equipment at bars and restaurants. The Cornelius keg has pressure relief built into its lid and is difficult to defeat unless done so intentionally. In general, kegs should be treated with respect as pressurized containers. They should not be opened or repaired unless they are confirmed as depressurized. They should not be heated or stored in hot areas. If kegs are damaged, they should be taken out of service or returned to their manufacturer for repairs.

**Boilers**

Some craft breweries use direct-fired kettles, but most use boilers to produce the steam needed for heating water for mashing, lautering, and boiling. Boilers are regulated by the Pressure Vessel Safety Orders and require permits to operate. Boiler maintenance, operation, inspection and permits to operate vary depending on the output of the boiler and its degree of automation. Specialized assistance on boiler operation should be requested from the manufacturer or the boiler inspector.

**Electrical Safety**

Only qualified personnel shall work on electrical equipment or systems. A qualified person is one designated by the employer who has received training and has demonstrated skills and knowledge in the construction and operation of electrical equipment and installations and the hazards involved. Some states have licensing requirements for electricians.
Electrical equipment must be maintained free from recognized hazards that are likely to cause death or serious physical harm to employees. Signs should provide warning of electrical hazards. Electrical distribution panels should be labeled with the voltage they carry.

Electrical systems must be maintained with the appropriate strength and durability, including, for parts assigned to enclose and protect other equipment, the adequacy of that protection. This OSHA language means that covers must be in place on power distribution and control panels, junction boxes and conduit enclosed or sealed, and barriers in place to protect from traffic.

Electrical installations must be done according to code. A qualified electrician or electrical contractor should be consulted to ensure that ground fault circuit interrupter protection is provided in those areas where it’s required. Care should be taken to ensure that water intrusion is prevented at distribution panels, junction boxes, and other openings or points of access to energized electrical components.

Electrical distribution panels must be labeled such that each breaker is identified with the equipment it operates. Electrical isolation devices must be equipped such that they will accept lockout devices.

Extension cords may only be used temporarily and should not become part of the fixtures. Damaged insulation on conductors or other visible damage to electrical components or cords must be repaired immediately or the equipment taken out of service.

Tasting Rooms

The tasting room presents a number of challenges to safety and some of these are considered in this section. Due to the differences in tasting room rules and configurations this section is strictly aimed at non-restaurant establishments.

**Potential hazards for bartenders/servers include:**

- Balancing or lifting glasses while serving or clearing tables
- Lifting large, overfilled containers of dirty glassware
- Lifting cases, kegs and stocking merchandise
• Repetitive reaching across tables to serve customers or to clear tables
• Moving and lifting tables and chairs to accommodate customers
• Slips, trips and falls

**Safe work practices include:**

• Keep your eyes on your task and eyes on your path.
• Do not move too quickly for conditions. Slippery floors or customers and co-workers may be just around the corner.
• Wear non-slip, low heel shoes.
• Make gradual turns at corners — avoid pivoting on one foot.
• Communicate with your co-workers when you need a hand with a large order being delivered.
• Be courteous and step out of the way to allow co-workers to pass while they are carrying loads.
• Keep floors and walkways clean and clear of hazards. It is your job to clean up spills. Place a warning cone/sign on wet areas until they are dry.
• Clean up broken glass or dishes with a broom & dust pan. Do not use your hands.
• Never lift more than you can handle—half barrels require two people to lift.
• Avoid awkward postures when carrying beverages.
• Keep wrists straight when carrying orders. Alternate carrying arms so one arm does not do all the work.
• Do not reach over the table to pick up or deliver drinks as this may cause repetitive strains.
• Get help when moving heavy tables and chairs. Don’t lift them alone.

**Glassware:**

• Do not stack or place drinking glasses inside each other—they can get stuck and cuts occur when trying to separate them. The stress can also cause them to break while carrying them.
• Carry one rack of glassware at a time.
• Visually inspect all glassware for cracks or chips before handling. If
chips or cracks are discovered in the glasses, place them in containers designated for broken glass.

- Do not use a drinking glass to scoop ice. Use a plastic or metal scoop or pan.
- Do not submerge hot glass in cold water or submerge cold glass in hot water.
- In the unlikely event that glass is broken in the ice bin, pour hot water into the bin to melt down the ice letting the melted ice empty through the drain then remove the glass using a small broom and dust pan, hose down minute pieces of glass into the drain with clean water, and wipe the bin dry with a towel before refilling it with ice.

**Dishwashing**

- Wear rubber gloves when washing and sanitizing dishes and tap equipment.
- If glassware breaks in the sink or dishwasher, use tongs to remove the large fragments of glass; open a drain; run the water to wash any remaining small glass fragments down the drain.