Chapter 1

Safety

It's hard to walk past the plant gate or the security office without seeing a sign indicating how many days since the last lost-time accident at the facility. Most employers take great pride in their safety record and preach safety as a way of life. This section includes some tips and information for keeping your operations safe.

OSHA

The Occupational Safety and Health Act (OSHA) in the United States covers workplace conditions for employees. If you are engaged in maintenance, repair, or installation activities, your employer probably has details on the particular parts of the OSHA standards that apply to you.

As a mechanical tradesperson, you might find yourself involved in many activities that require you to think out particular safety issues for your own special type of work. For example, you might be servicing a pump and have all the parts and the manufacturer's manuals, but it would make a great deal of difference in your approach to the job if the pump were handling acid instead of water. You have to consider the safety details for each job, using your trade skills combined with your knowledge of the process, location, or conditions.

Employers are required by OSHA to provide a safe and healthy workplace for their employees. In addition, they are also required to provide safety training if employees are expected to handle any hazardous materials. The employee has the right to request information about any specific health or safety hazard in the workplace. In addition, the employee has the right to information on what procedures will be followed if the employee is involved in an accident or might be exposed to a toxic material. For the most part, the Act promotes communication between the employer and employee so they can work together to reduce workplace hazards and minimize risks.

Lock Out and Tag

When you shut down a machine, process, pipeline, or electrical apparatus to inspect it or perform a repair, you need to *lock out and tag* a piece of equipment so that it cannot be accidentally started or energized. Usually, the start/stop of the switchgear controlling the piece of equipment is physically disabled with a lock (Figure 1-1).

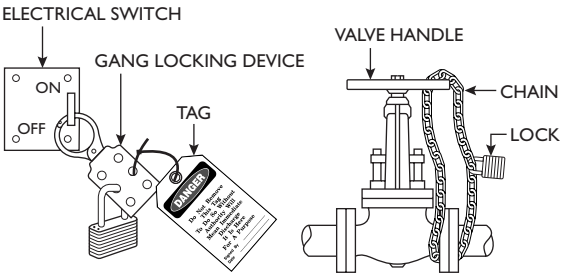

Figure 1-1 Lock out and tag.

The employee working on the equipment usually holds the key to the lock. The lock itself has a tag identifying whose lock is being used. In the case of a pipeline, the valve controlling the flow into the line is closed and a lock placed on the handle or bonnet with an appropriate tag attached. If two or more people are working at the same machine, then each additional person also places a lock on the equipment. A gang-locking device can be used to hold many locks on the job. In addition, it's a smart idea to try the local start/stop switch at the machine site or to open the valve downstream from the locked main valve as a double check to make sure that the machine or process is "safed-out."

It is generally true that a lock out and tag procedure should be followed if service or maintenance is required on any machinery or equipment where injury could take place from either a sudden release of stored energy or an unexpected startup of the machine. Some sample jobs that will usually have a lock out and tag procedure include:

- Inspection or testing of machine parts.
- Change-out of oil in a large gearbox or other reservoir.
- Repairing or testing electrical equipment.
- Working on a steam line, pressurized lines, or lines handling hazardous fluid.

- Freeing up jams in production line equipment.
- Teardown or major repair of mechanical equipment.
- Clearing product from process equipment.

While the particular lock out and tag procedure used at a specific plant or worksite might change depending on the location, the following ideas are good ones:

1. Make sure that each and every employee involved in the job has his or her own lock installed. Two people using one lock is never a good idea.
2. Always test the equipment by pressing the local start/stop switch or by slightly cracking open a downstream valve to make sure equipment doesn't run or material will not flow. Just because a motor starter's nameplate, located in a motor control room, matches the nameplate on the remote machine does not mean that misidentification could not happen. Always do a double check to make sure the device that is locked out is really "dead."
3. When you leave the job at the end of the shift and the next shift continues the work, make sure to remove your lock. It is never a good idea to "cut the lock off" for an employee who has left the job. This should be done only as a last resort and only when you are absolutely sure the employee has left the jobsite for the day.
4. If many people are on the same job, the use of a gang-locking device makes sense. That way there are no excuses for each individual not having a lock in place.
5. Use a lockout lock or lockout tag only for its intended purpose. The locks should have unique characteristics that identify them as safety locks. Safety locks should never be used for security of a toolbox or a locker. Obtain different locks for that purpose.
6. Open *your* lock with *your* key. Don't ever send another person to do it. Safety is a personal possession.

MSDA

Another safety issue for maintenance or installation personnel is the use of chemicals or hazardous materials. In the United States, Material Safety Data Sheets (MSDA) are used to identify the details of each particular chemical and to list safe handling techniques. These sheets, usually available in the workplace, indicate if rubber boots, face shield, respirator, dust mask, or goggles might be required

to work safely around a substance. Keep in mind that oil or grease can be classified as chemicals, too. Removed parts of a machine often need to be cleaned after disassembly and require chemical degreasers or solvents.

A little-known fact is that MSDA sheets must also include first aid measures. These procedures are written for people who may not have received first aid training. With many first aid procedures, the first few seconds or minutes count. It's a good idea to review any MSDA sheet for each new material that you intend to use or contact to become familiar with how to handle it and what to do if an accident occurs—before an incident occurs.

Use of Protective Equipment

Often the maintenance worker needs gloves, a hard hat, steel-toe shoes, earplugs, or other articles of apparel to guard against injury to the eyes, feet, head, or ears. Jobs such as grinding, drilling, nailing, painting, or welding mandate protective gear (Figure 1-2).

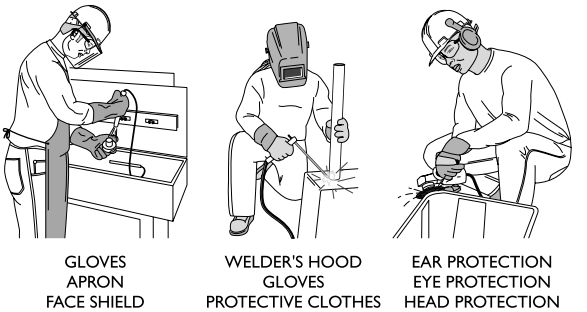

Figure 1-2 Use of protective equipment.

Some special jobs require more expensive and extensive protective equipment. Examples might be nonsparking boots where explosive mixtures are present, special glasses to be used around laser light, or cut-resistant gloves for use with sharp knives or saws.

Confined-Space Entry

While the actual OSHA definition of a confined space is rather lengthy, the Act generally defines a confined space as an area that is large enough for an employee to enter totally and perform work and that also has limited means for entry and exit. Entering a tank, a pipeline, a manhole, or a silo would be excellent examples of

confined-space entry (Figure 1-3). Usually a permitted type of entry system is required for work in a confined space. Although the particular permit may not be the same at different workplace locations, it usually includes the use of a buddy system (two people assigned with one standing watch), checking the confined space for toxic materials and oxygen levels, and informing others when entry is necessary. Typically, work permits are dated and valid for a particular time period—usually only one shift. In many cases, artificial ventilation or the use of a safety harness or safety line may be necessary. Many industrial accidents in the past have been related to confined-space entry. Because of this fact, a separate section of the OSHA requirements was instituted to make sure that employers and employees pay particular attention to the unique hazards presented by confined spaces.

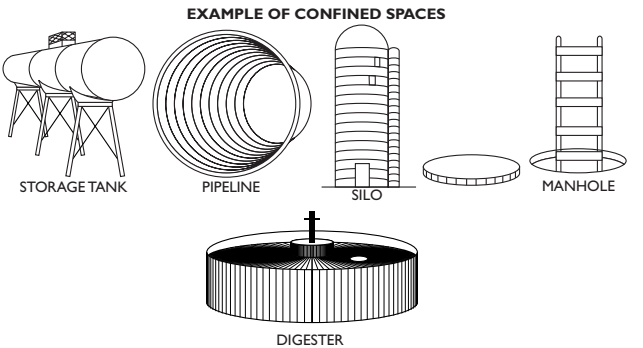

Figure 1-3 Examples of confined spaces.

The atmosphere in a confined space is of particular concern. Most people immediately think of the potential for flammable or toxic fumes within a confined space, but they forget about the most important factor: the lack of oxygen. The oxygen level of a confined space can decrease because of work being done—such as welding, cutting, or brazing—or it can be decreased by certain chemical reactions (rusting) or through bacterial action (fermentation). Figure 1-4 shows an oxygen scale and indicates safe and unsafe levels for occupants of a confined space. Any atmosphere with less than 19.5 percent oxygen should not be entered without an approved self-contained breathing apparatus.

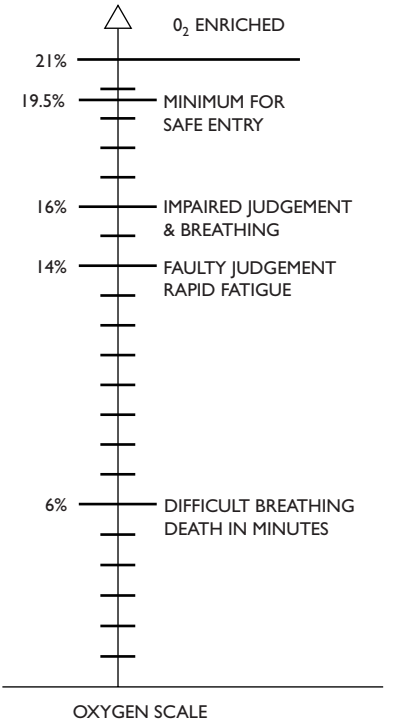

Figure 1-4 Oxygen scale for confined-space work.