CUTTING, WELDING AND OTHER HOT WORK

INTRODUCTION

Welding, brazing, flame or plasma cutting, hot riveting, grinding, chipping, sweating, soldering and other activities that produce sparks or use flame are important tools of modern industry. The portability of some of the equipment and its careless use outside of areas specifically designed for its safe use, such as maintenance shops or manufacturing areas designated as hot work areas, can increase the likelihood of fire that will destroy facilities and interrupt production. To make sure portable cutting, welding and other hot work for maintenance, construction or modifications is done safely, a permit system should be used.

POSITION

Design production areas and specifically designated sections of the maintenance shop where hot work is routinely done to minimize the hazards hot work operations present. (See PRC.1.13.0.)

To properly control the hazards of portable hot work equipment, establish a comprehensive hot work control program that includes the following elements:

- Assigning responsibility for the program;
- Establishing and implementing a permit system;
- Providing the necessary safety equipment;
- Providing the personnel necessary to implement the safety regulations.

DISCUSSION

While industrial cutting, welding and other hot work are common and useful production, construction, modification and maintenance methods, they introduce hazards that must be controlled.

The principal hazard associated with portable hot work equipment is the introduction of unauthorized ignition sources into random areas of the facility. Temperatures sufficient to start fires or ignite explosive materials may come from a number of sources including:

- The open flame of a torch;
- Metals being cut or welded;
- Molten slag or metal that flows from the work;
- Sparks that fly from the work;
- An improperly handled soldering iron or propane torch;

- Dropped hot rivets;
- Improperly applied electric arc welding grounding clamps.

In 1953, improper cutting or welding resulted in a fire and subsequent property damage in excess of $325 million (2015 values). The fire began when sparks from cutting ignited residue in an uncovered portion of a very long drip pan located approximately 11 ft (3.35 m) above the floor in an unsprinklered area. Until then, workmen had covered the portion of the drip pan where they were working with a tarpaulin which they repositioned as they moved. In this case, they neglected to move the tarpaulin and sparks ignited the uncovered residue. The fire was spotted by the fire watch, who tried unsuccessfully to extinguish it from floor level with a portable extinguisher. Other employees also used portable extinguishers, but no single extinguisher was adequate to put out the fire.

During the next 10 min, the fire intensified and molten asphalt began to seep through the roof deck joints into the building below.

After the public fire department arrived, firefighters discovered that their hose streams were inadequate to reach and extinguish the blaze. The fire developed so rapidly that it traveled the entire 1800 ft (549 m) length of the building in an hour and a quarter. The 1,575,000 ft² (146,475 m²) plant was almost totally destroyed.

To prevent losses like this, management should appoint a responsible person to closely supervise the use of all cutting, welding and other hot work equipment. Employees and outside contractors should secure a written permit from this supervisor before beginning hot work. Such a permit system will help impress upon the persons doing and overseeing the work that proper procedures and controls are very important.

To aid its clients, AXA XL Risk Consulting has developed a permit program. (See PRC.1.9.0.A.) A cutting, welding or hot work permit should be filled out each time hot work is conducted and should be kept available at the job site.

LOSS PREVENTION AND CONTROL FOR CUTTING, WELDING, HOT WORK OPERATIONS

INTRODUCTION

The essence of a good hot work permit program is as follows:

- The program should be supervised by a qualified individual such as a welding superintendent, maintenance foreman, fire chief, plant engineer or master mechanic.
- This individual should examine the location of any proposed work, insist on other methods if conditions cannot be made safe and make sure that the precautions listed on the permit are taken.
- The individual should then sign a permit (see illustration) and give it to the welder. No work should be allowed without a properly signed permit at the job site.
- If work at a location continues for more than one shift, a new permit should be issued for each shift.

Welders and other personnel who might be using hot work equipment should be instructed in precautions to be taken and a list of these precautions should be posted in the maintenance shop, on the equipment and on the permit. These precautions should include:

- Performing hot work in a properly arranged maintenance shop except when the job cannot be moved to it.
- Using only equipment that is in good condition. Valves, regulators, hoses and torches should be thoroughly checked.
- Refraining from using welding, cutting or other hot work equipment in a building where sprinklers are out of service.
- Moving combustibles at least 35 ft (11 m) from hot work operations. If combustibles cannot be moved, they must be protected by metal guards or by flameproofed curtains or covers rather than ordinary tarpaulins.
- Prohibiting hot work in or on vessels containing flammable or combustible materials, including residues, until they have been completely cleaned and purged or inerted.
- Checking the atmosphere for combustible gases or vapors where necessary, using reliable detection equipment. If there is a chance of a gas vapor release during hot work operations, continuous-duty portable combustible gas detectors should be used to constantly monitor the area.
- Prohibiting hot work until surrounding floors have been swept clean and, if combustible, wet down.
- Prohibiting hot work until all wall and floor openings within 35 ft (11 m) of the operations have been tightly covered or otherwise protected with metal guards or flameproofed tarpaulins.
- Prohibiting hot work until responsible persons have been assigned to watch for dangerous sparks in the area and on floors above and below.
- Securing gas cutting and welding cylinders so they will not be upset or damaged and replacing protective caps on all cylinders not actually in use.
- Carefully connecting the ground clamp when using electrical arc welding equipment. Since an improperly made ground can be a source of ignition, the ground clamp should be connected as close to the work as possible so that it may be easily observed.

- Arranging for a continuous fire watch to patrol of the area, including floors above and below, during work, any break in the work such as lunch or rest periods, and for at least one (1) hour after the work has been completed. Provide three (3) hours of periodic random patrols (not more that 15 minutes apart) through the work area after the fire watch has been released, for a total of 4 hours after work has been completed. If the hot work ends near the time of a shift change, make arrangements for the patrols to continue into the next shift.
- Using portable stands to elevate welding hose or cable off floor areas where it can be easily damaged.

The cutting, welding and hot work permit and the warning tag are both printed on canary stock.