American Welding Society
Safety and Health
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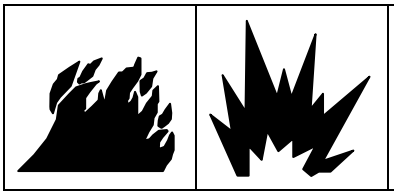

Fire and Explosion Prevention

INTRODUCTION

Welding, cutting, and allied processes produce molten metal, sparks, spatter, slag, and hot work surfaces. These can cause fire or explosion if precautionary measures are not followed.

NATURE OF THE HAZARDS

Flying sparks, spatter and molten metal are the main cause of fires and explosions in welding and cutting. They can travel up to 35 feet (10.7 meters) from the work area. They can travel greater distances when falling, or with some processes, they can pass through or become lodged in cracks, clothing, pipe holes, and other openings in floors, walls, or partitions. Heat can be transferred through walls and surfaces.

Typical combustible materials inside buildings include: cardboard, wood, paper, rags, clothing, plastics, chemicals, flammable liquids and gases, dusts, and trash. Parts of buildings such as floors, partitions, and roofs may also be combustible.

Typical combustible materials outside buildings include dry leaves, grass, brush, and trash.

Welding and cutting can cause explosions in spaces containing flammable gases, vapors, liquids, or dusts. Special precautions are needed for any work on containers and piping (see AWS F4.1).

HOW TO AVOID THE HAZARD

- Read and follow the manufacturer's instructions, labels, and equipment manuals before installing, operating, or servicing the equipment.
- Develop adequate procedures and use proper equipment to do the job safely.
- When required obtain a Hot-Work Permit (See NFPA 51B).
- Remove combustible materials from a sphere with a minimum radius of 35 feet (10.7 meters) around the work area or move the work to a location well away from combustible materials.
- If relocation is not possible, protect combustibles with fire resistant covers.
- If possible, enclose the work area with portable, flame-resistant screens.
- Cover or block all openings within the 35 foot radius (10.7 meters), such as doorways, windows, cracks, or other openings with fire resistant material.

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- Do not weld on or cut material having a combustible coating or internal structure, such as in walls or ceilings, without an appropriate method for eliminating the hazard.

- When needed, have a qualified person perform the fire watch in the work area during and after work is completed as long as necessary to assure a fire hazard no longer exists. (See NFPA 51B.)

- After welding or cutting, make a thorough examination of the area for evidence of fire. Remember that easily visible smoke or flame may not be present for some time after the fire has started. Be alert since combustibles such as wood dust can smolder for extended periods of time (days).

- Dispose of hot slag in proper containers avoiding contact with combustible materials.

- Keep appropriate fire extinguishing equipment nearby, and know how to use it.

- Make sure all electrical equipment and wiring are installed properly and have recommended circuit protection.

- Do not overload or improperly size input conductors and/or weld output conductors to prevent fire hazards.

- Connect the work cable to the work as close to the welding zone as practical to avoid stray weld current paths.

- Do not weld or cut in atmospheres containing reactive, toxic, or flammable gases, vapors, liquids, or dust.

- Do not create dust clouds. Some dust clouds can explode.

- Do not apply heat to a workpiece covered by an unknown substance or coating that can produce flammable, toxic, or reactive vapors when heated.

- Do not apply heat to containers or piping that have held unknown substances or combustible materials unless containers or piping are made or declared safe. (See AWS F4.1.)

- Provide adequate ventilation in work areas to prevent accumulation of flammable gases, vapors, or dusts.

- For handheld laser welders consider the potential ignition forward of a laser welding torch from a specular (mirror like) reflection.

SUMMARY

Remember that sparks can travel in all directions up to a distance of 35 feet (10.7 meters) from the work and pass through or become lodged in all kinds of openings and cause fires where least expected. Recognize that sparks can travel well beyond the 35 foot (10.7 meters) radius when falling or during plasma arc cutting and air carbon arc cutting or gouging. Remove combustible materials and prevent flammable gases, vapors, and dusts from accumulating in the work area to reduce the possibility of a fire or explosion. Always have appropriate fire extinguishing equipment nearby, and know how to use it.

Fires and explosions can be prevented by being aware of your surroundings, minimizing the combustibles in them, and

taking the appropriate protective precautions.

INFORMATION SOURCES

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes,* American Welding Society<www.aws.org>.

AWS, *Fire Safety in Welding and Cutting*, Pamphlet, American Welding Society, <www.aws.org>.

AWS F3.2, *Ventilation Guide for Weld Fume*, American Welding Society, <www.aws.org>.

AWS F4.1, *Safe Practices for the Preparation for Welding and Cutting of Containers or Piping*, American Welding Society <www.aws.org>.

MSHA, *Title 30 Mineral Resources, Parts 1-199*, Mine Safety and Health Administration, *Code of Federal Regulations (CFR)*, <www.msha.gov>.

NFPA, *Fire Prevention Handbook,* National Fire Protection Association, <www.nfpa.org>.

NFPA 51B, *Standard for Fire Prevention During Welding Cutting, and Other Hot Work,* National Fire Protection Association, <www.nfpa.org>.

NFPA 2112, *Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire*, National Fire Protection Association, <www.nfpa.org>.

NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire*, National Fire Protection <www.nfpa.org>.

OSHA, *Title 29 Labor, Parts 1901.1 to 1910.1450*, Occupational Safety and Health Administration, *Code of Federal Regulations (CFR)*, <www.osha.gov>.