American Welding Society
Safety and Health
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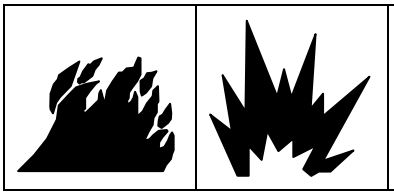

Fire and Explosion Prevention

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: 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 (see AWS F4.1).

HOW TO AVOID THE HAZARD

- 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, fire-resistant screens.
- Cover or block all openings within the 35 foot radius, 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 firewatcher in the work area during and for at least 30 minutes after the job is finished

- 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, combustibles such as wood dust can smolder for extended periods of time (days).

- Do not dispose of hot slag in containers holding combustible material.

- 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 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 a container that has held an unknown substance or a combustible material unless container is made or declared safe. (see AWS F4.1).

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

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.

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INFORMATION SOURCES

American National Standards Institute (ANSI). *Safety in Welding, Cutting, and Allied Processes*, Z49.1, available from American Welding Society, 8669 Doral Blvd., Doral, FL 33166. Phone 800-443-9353; Web site: www.aws.org.

National Fire Protection Association (NFPA), *Standard for Fire Prevention During Welding Cutting, and Other Hot Work*, NFPA 51B, available from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, Massachusetts USA 02269-9101. Phone: 617-770-3000; Web site: www.nfpa.org

Occupational Safety and Health Administration (OSHA). *Code of FederalRegulations*,Title 29 Labor, Chapter XVII, Parts 1901.1 to 1910.1450, available from Superintendent of Documents, U.S. Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250-7954. Phone: 866-512-1800; Web site: www.osha.gov.

American Welding Society (AWS). *Safe Practices for the Preparation for Welding and Cutting of Containers or Piping*, AWS F4.1, available from the American Welding Society, 8669 Doral Blvd., Doral, FL 33166. Phone: 800-443-9353; Web site: www.aws.org.

American Welding Society (AWS). *Fire Safety in Welding and Cutting*, Pamphlet, available from the American Welding Society, 8669 Doral Blvd., Doral, FL 33166. Phone: 800-443-9353; Web site: www.aws.org.

Mine Safety and Health Administration (MSHA). *Code of Federal Regulations*, Title 30 Mineral Resources, Parts 1-199, available from Superintendent of Documents, U.S. Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250-7954. Phone: 866-512-1800; Web site: www.msha.gov.

National Fire Protection Association (NFPA), *Fire Prevention Handbook, 20th Edition*, available from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, Massachusetts USA 02269-9101. Phone: 617-770-3000; Web site: www.nfpa.org.

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