This policy is meant to provide basic information in any given occupancy, all other Fire Code requirements will be enforced, these will be addressed by the Fire Inspector during inspections. Questions can be addressed to the Fire Prevention Division office between 7 a.m. to 3 p.m. Monday thru Friday, at (720) 913-3474 or at DENFPB@DENVERGOV.ORG. Permits may be obtained via E-Permits – Accela Citizen Accela available at Denver Fire Department - Fire Safety Operational Permits.

I. SCOPE

This policy covers permitting requirements as they pertain to the performance of HOT WORKS within the City and County of Denver. Areas covered in this policy include cutting, welding (including arc-welding), use of open torch, brazing, glass blowing, or any process that causes a spark or similar operations.

II. DEFINITIONS

A. Hot Work. Includes cutting, welding, thermal welding, brazing, soldering, grinding, thermal spraying, thawing pipe, installation of torch-applied roof systems or any other similar activity.

B. Hot Work Area is the area that is exposed to sparks, hot slag, or radiant or convective heat as a result of the hot work.

C. Hot Work Equipment is electric or gas welding or cutting equipment used for hot work.

D. Hot Work Permits. Permits issued by the responsible person at the facility under the hot work permit program permitting welding or other hot work to be done in locations referred to in Section 3503.3 and pre-permitted by the fire code official.

E. Hot Work Program. A permitted program, carried out by approved facilities-designated personnel, allowing them to oversee and issue permits for hot work conducted by their personnel or at their facility. The intent is to have trained, on site, responsible personnel ensure that required hot work safety measures are taken to prevent fires and fire spread.

III. SITE INSPECTION FOR DENVER FIRE DEPARTMENT PERMIT

A. Upon successful approval of permit from the Denver Fire Department, Fire Prevention Division, a Fire Inspector may conduct a field inspection of the site. Compliance with all Fire Code requirements shall be maintained at all times. The
permit shall be kept on site and is only valid for the owner, time frame and site address indicated on the permit.

A permit may be revoked when:
1. Any of the conditions or limitations set forth in the permit have been violated
2. Compliance with written orders has not been achieved
3. False statements or misrepresentations of information provided in the permit application are found
4. The permit is issued in error or in violation of an ordinance, regulation or the Fire Code

IV. CONDITIONS OF PERMIT

A. Restricted Areas. Hot work shall only be conducted in areas designed or authorized for that purpose by the personnel responsible for a hot work program. Hot work shall not be conducted in the following areas unless approval has been obtained from the fire code official
1. Areas where the sprinkler system is impaired
2. Areas where there exists the potential of an explosive atmosphere, such as locations where flammable gases, liquids or vapors are present.
3. Areas with readily ignitable materials, such as storage of large quantities of bulk sulfur, bled paper, cotton, lint, dust or loose combustible materials.
4. On board ships at dock or shops under construction or repair.
5. Areas where uncleaned or improperly prepared drums, tanks, or other containers and equipment that have previously contained materials that could develop explosive atmospheres
6. At other locations as specified by the fire code official.

B. Records. The individual responsible for the hot work area shall maintain “prework check” reports. Such reports shall be maintained on the premises for not less than 48 hours after work is complete.

C. Signage. Signs stating “CAUTION—HOT WORK IN PROGRESS—STAY CLEAR” shall be posted where the hot work area is open to persons other than the operator of the hot work equipment, conspicuous signs shall be posted to warn others before they enter the hot work area.

D. Combustibles. Hot work areas shall not contain combustibles or shall be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.

E. Openings. Openings or cracks in walls, floors, ducts or shafts within the hot work area shall be tightly covered to prevent the passage of sparks to adjacent combustible areas, or shielded by metal fire-resistant guards, or curtains shall be provided to prevent passage of sparks or slag.

F. Housekeeping. Floors shall be kept clean within the hot work area.
G. Conveyer Systems. Conveyer systems that are capable of carrying sparks to distant combustibles shall be shielded or shut down.

H. Partitions. Partitions segregating hot work areas from other areas of the building shall be noncombustible. In fixed hot work areas, the partitions shall be securely connected to the floor such that gaps do not exist between the floor and the partition. Partitions shall prevent the passage of sparks, slag, and heat from the hot work area.

I. Sprinkler protection. Automatic sprinkler protection shall not be shut off while hot work is performed. Where hot work is performed close to automatic sprinklers, noncombustible barriers or damp cloth guards shall shield the individual sprinkler heads and shall be removed when the work is completed. If the work extends over several days, the shields shall be removed at the end of each workday. The fire code official shall approve hot work where sprinkler protection is impaired.

J. Fire watch shall be provided during hot work activities and shall continue not less than thirty (30) minutes after the conclusion of the work. The fire code official, or the responsible manager under a hot work program, is authorized to extend the fire watch based on the hazards or work being performed. A permit for fire watch may be required anytime hot work is conducted after hours or heating inside structures occupied by the public.

K. Location. The fire watch shall include the entire hot work area. Hot work conducted in areas with vertical or horizontal fire exposures that are not observable by a single individual shall have additional personnel assigned to fire watches to ensure that exposed areas are monitored.

L. Duties. Individuals designated to fire watch duty shall have fire-extinguishing equipment readily available and shall be trained in the use of such equipment. Individuals assigned to fire watch duty shall be responsible for extinguishing spot fires and communicating an alarm.

M. Fire Training. The individuals responsible for performing the hot work and individuals responsible for providing the fire watch shall be trained in the use of portable fire extinguishers.

N. Fire Extinguisher. A fire extinguisher with a minimum rating of 2-A:20-B:C shall be located within 30 feet of hot work operation.

O. Quantities. This permit covers the minimum requirements for compressed gas (flammable 200 cf, oxidizer 504 cf). A permit for compressed gas (if over 200 cf flammable gas, except LPG and 504 cf of an oxidizer are used) or LPG use/storage/handling (when 1 pound or more of LPG is used) may be required for Hot Work operations.

P. Pre-hot-work check. A pre-hot-work check shall be conducted prior to work to ensure that all equipment is safe, and hazards are recognized and protected. A report of the check shall be kept at the work site during the work and available upon request. The pre-hot work check shall determine all of the following:
1. Work equipment to be used is in satisfactory operating condition and in good repair
2. Hot Work site is clear of combustible materials or that combustible materials are protected.
3. Exposed construction is of non-combustible materials or, if combustible, then protected
4. Openings are protected
5. Floors are kept clean
6. No exposed combustibles are located on the opposite side of partitions, walls, ceilings or floors
7. Fire Watches, where required, are assigned
8. Fire extinguishers are verified as operable and available
9. Approved actions have been taken to prevent accidental activation of suppression and detection equipment in accordance with Denver Amendments.

Q. Cylinders connected for use. The storage or use of a single cylinder of oxygen and a single cylinder of fuel gas located on a cart shall be allowed without requiring the cylinders to be separated when the cylinders are connected to regulators, ready for service, equipped with apparatus designed for cutting or welding and all of the following:
   1. Carts shall be kept away from cutting or welding operation or fire-resistant shields shall be provided.
   2. Cylinders shall be secured to the cart to resist movement
   3. Cylinder valves not having fixed hand wheels shall have keys, handles, or nonadjustable wrenched on valve stems while the cylinders are in service.
   4. Cylinder valves shall be closed when work is finished
   5. Cylinder valves shall be closed before moving the cart.

R. Precautions. Cylinders, valves, regulators, hose and other apparatus and fittings for oxygen shall be kept free from oil and grease. Oxygen cylinders, apparatus and fittings shall not be handled with oily hands, oily gloves, or greasy tools or equipment.

S. Acetylene gas. Acetylene gas shall not be piped except in approved cylinder manifolds and cylinder manifold connections or utilized at a pressure exceeding 15 pounds per square inch gauge (psig) (103kPa) unless dissolved in a suitable solvent in cylinders manufactured in accordance with DOTn 49 CFR Part 178.

T. Remote locations. Oxygen and fuel-gas cylinders and acetylene generators shall be located away from the hot-work areas to prevent such cylinders or generators form being heated by radiation from heated materials, sparks or slag, or misdirection of torch flame.
U. **Cylinders shutoff.** The torch valve shall be closed and the gas supply to the torch completely shut off when gas welding or cutting operations are discontinued for a period of one hour (1) or more.

V. **Electric Arc hot work Return Circuits.** Welding current return circuits from the work to the machine shall have proper electrical contact at joints. The electrical contact shall be periodically inspected.

W. **Disconnecting.** Electrodes shall be removed from the holders when electric arc welding or cutting is discontinued for any period of 1 hour or more. The holders shall be located to prevent accidental contact and the machines shall be disconnected for the power source.

X. **Emergency disconnect.** A switch or circuit breaker shall be provided so that fixed electric welders and control equipment can be disconnected from the supply circuit. The disconnect shall be installed in accordance with NFPA 70

Y. **Acetylene Generators.** The use of acetylene generators shall comply with this Section and NFPA 51 and 51A and NFPA 55.

Z. **Portable Generators.** The minimum volume of rooms containing portable generators shall be 35 times the total gas generating capacity per charge of all generators in the room. The gas-generating capacity in cubic feet per charge shall be assumed to be 4.5 times the weight of carbide per charge in pounds. The minimum ceiling height of rooms containing generators shall be 10 feet. An acetylene generator shall not be moved by derrick, crane or hoist while charged.

AA. **Protection against freezing.** Generators shall be located where water will not freeze. Common salt such as sodium chloride or other corrosive chemicals shall not be utilized for protection against freezing.

VI. **PERMIT COST**

A. See Permit Fee Table at [www.denvergov.org/Fire](http://www.denvergov.org/Fire) for current fees

B. **Helpful Information**

Businesses become successful because their management take calculated risks built from research and planning. Yet every day these same businesses are willing to risk their very livelihood by allowing uncontrolled hot work in their facility. By its very nature, uncontrolled hot work is a roving fire hazard in your facility. The increasing trend toward outsourcing only complicates this issue when contractors are used who don’t have the needed expertise on the process or construction hazards in your facility.

According to statistics compiled by the National Fire Protection Association, during the past 10 years, one out of every 20 structural fire losses in commercial properties was started by improperly managed hot work. Each of these fire incidents was preventable. Hot work comes in a variety of applications, each with its own heat source severity. Under the right conditions, even hot work heat
sources with the lowest temperature ratings can easily ignite what seem to be hard to burn materials.

Hot work ignition sources can get into areas that are not easily seen, such as:

1. Through operating HVAC systems
2. In and alongside pipes extending through walls/floors
3. Through openings in floors
4. Concealed spaces with combustible construction

A fire in a hidden area can often go unnoticed until it's well established. Many hot work fires will smolder for several hours before breaking out in open flames – potentially long after your facility is shut down for the day.

Contractors bring a level of expertise in the areas of work they perform. But contractors specialize in their particular business activity and not in property loss prevention or knowing hazards specific to all facilities.

Hot work is an increasing cause of fires and explosions throughout the world. Fire statistics clearly show there is no industry or type of facility that is immune to this hazard. There are many factors that contribute to a fire including:

1. Flammable liquids
2. Concealed spaces
3. Operating conveyor HVAC system
4. Poor housekeeping
5. Plastics in construction
6. Combustible materials

Hot work is any operation producing flames, sparks, or heat. Cutting, welding, brazing, grinding, sowing, soldering, thawing frozen pipes, applying roof covering, sealing plastic shrink-wrap by torch, and using a plumber’s torch are all examples of hot work.

**HEAT SOURCE TEMPERATURE RATINGS**

<table>
<thead>
<tr>
<th>Heat Source</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen/Acetylene Cutting Torch</td>
<td>6,330°F (3,316°C)</td>
</tr>
<tr>
<td>Electric Arc Welder</td>
<td>10,900°F (6,020°C)</td>
</tr>
<tr>
<td>Welding Torch Slag</td>
<td>&gt; 2,000°F (1,093°C)</td>
</tr>
<tr>
<td>Propane Torch</td>
<td>3,595°F (1,979°C)</td>
</tr>
<tr>
<td>Radial Metal Cutting Saw</td>
<td>&gt; 1,000°F (538°C)</td>
</tr>
<tr>
<td>Wheel Grinder</td>
<td>&gt; 1,000°F (538°C)</td>
</tr>
<tr>
<td>Electric Heat Gun</td>
<td>600 – 1,350°F (732°C)</td>
</tr>
</tbody>
</table>
IGNITION TEMPERATURE

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrugated Paper</td>
<td>380 - 500°F (260°C)</td>
</tr>
<tr>
<td>Styrene</td>
<td>914°F (490°C)</td>
</tr>
<tr>
<td>Typical Asphalt</td>
<td>905°F (485°C)</td>
</tr>
<tr>
<td>Polyurethane Foam</td>
<td>824°F (440°C)</td>
</tr>
<tr>
<td>Mineral Spirits</td>
<td>473°F (245°C)</td>
</tr>
<tr>
<td>Lubricating Oil (motor/mineral)</td>
<td>500 - 700°F (260 - 371°C)</td>
</tr>
<tr>
<td>Wood Products</td>
<td>380 - 800°F (262 - 426°C)</td>
</tr>
</tbody>
</table>

Fires are not an inherent hazard that comes with doing hot work. Hot work is a hazardous operation in the best of conditions. Because hot work is often conducted during off-shifts or weekends, the hazard and risk created in any facility is magnified because of no employees or a minimal number of employees in the facility. Hot work operations must be managed at all times. Effective hot work management means you prevented a fire from occurring. There are many points in the hot works process where you have the opportunity to stop a fire before it starts. A strong program to manage hot works operations includes:

1. Seek another method. Search for an equally effective way to join, trim, or sever without compromising mechanical integrity.
2. Prepare the work area properly. Within 35 feet (11m) of the hot work in all directions is a critical area that must be kept clear of all combustible materials.
   a. Shield combustible flooring with wet sand, fire retardant tarpaulins, or sheet metal.
   b. Clean up the area, especially of oily deposits and trash.
   c. Cover any storage or other combustibles that cannot be moved out. Block off any duct openings.
   d. Cover or fill any openings in exposed walls, the floor, and the ceiling with non-combustible material or listed fire-stop material.
   e. Move away any combustibles on the other sides of walls being worked on. Clean dust and deposits outside and inside enclosures and ducts.
   f. Provide a fire retardant covering under the hot work where hot work will occur at a height. Examples: on building framing, the ceiling, or underside of the roof.
g. Close all doors and fire doors. First, check to be sure there is no significant gap under the door or along its sides. Sparks can roll under a closed door and ignite combustible material outside the hot work area.

Note: The alternative to the 35-ft. (11m) requirement is to designate an area only for hot work. This assures the item being worked on can be moved into this area. Isolate the area from the rest of the facility using noncombustible screens or partitions. Never let it become a temporary storage area.

1. Make sure fire protection and hot work equipment work properly. Sprinklers and portable fire extinguishers must be available, be in service, and operate properly. Hot work equipment must be in good repair. See International Fire Code Chapter 26 and Denver Amendments to that Chapter for these requirements.

2. Train the Fire Watch. Make sure the Fire Watch checks adjoining areas, including above and below the work area, especially where openings exist, and watch for fire during the hot work operation. Train the Fire Watch in using the portable fire extinguishers and in sounding the alarm and notifying Denver Fire Department Dispatch.

3. All employees involved in the hot works operation must demonstrate proficiency in the Denver Fire Code requirements for Hot Work. It is essential that all employees understand that these regulations are to be followed or they face consequences for violating regulations – including a Denver County Court summons.