14. Hot Work Program

14.1 Purpose


These regulations will minimize the possibility of injury or property damage due to improper management of open flame/high temperature processes. See Appendix A for definitions.

14.2 Hot Work Permit

14.2.1 For any hot work that is performed in a location that is not designated as a hot work area, a hot work permit must be used.

14.2.2 Designated Hot Works Areas that do not require a permit include:

**Designated hot work areas:**
- Building 32, Machine Shop and Plumbing Shop and Technical Services
- PAR TV (Bldg 96) Scene Shop
- Lubrecht Shop Complex Bldg 680 (Designated Area outside of shop)
- Yellowbay Shop and Pump House
- MISSOULA COLLEGE Trade and Tech Building II
- Elkhorn Court (Bldg 248)
- Golf Course Maintenance (Bldg. 309)
- Art Annex Studio
- Vehicle Repair Center

14.2.3 A sample permit is shown in Appendix B. For purposes of this policy, the Fire Safety Supervisor (FSS), will be defined as the supervisor of the employee doing the hot work and must be notified and is responsible for ensuring fire-safe working conditions. See Appendix C for fire safety precautions. The FSS is also responsible for making sure that stand-by fire extinguishers are present, assigning a fire watch when necessary, and making certain that all personnel in the area are properly warned of the work to be done. FSS will then issue a Hot Work permit.

14.2.4 The Fire Safety Supervisor will identify on the hot work permit:
- The location and nature of the hot work.
- The name of the person (employee or contractor) doing the job.
- The expiration date and time.
- The emergency notification procedures.

14.2.5 The employee or contractor must hang the permit in a visible place in the work area; the permit is kept there until the job is completed, including the time allotted for the fire watch if one was needed.

14.2.6 A fire extinguisher or, if suitable, a water hose must be kept in the immediate area.
of the work. If there is a fire extinguisher located in the room, the worker must identify the location prior to starting work.

14.2.7 The fire watcher observes the worker performing the hot work and keeps a constant vigil for stray sparks, ignition or other fire hazards. He/she must remain in the work area for at least a half-hour after the work is done to check for smoldering fires. Due to manpower constraints, a second individual may not be available to act as a fire watcher. In the event the work is being done by a single employee, that employee shall inspect the job site in no less than 30 minutes after the source of heat is extinguished.

14.2.8 If the hot work will done in a confined space, all confined space entry procedures must be followed.

14.2.9 The completed permit must be turned in at the end of the job to the Fire Safety Supervisor who will forward the completed permit to The University of Montana Risk Manager.

14.3 Personal Protective Equipment
Protection of the eyes, face, neck, and hands is required during any type of hot work. A welding helmet and heavy insulated gloves provide some of this protection. See Appendix D for shade requirements for various welding processes.

14.3.1 Only natural fiber clothing should be worn on the upper body extremities. A leather apron or full body leathers is recommended.

14.3.2 Respiratory protection is not required for most welding jobs if good ventilation is provided. Appendix E provides guidelines to assist in the determination of the need for respiratory protection.

14.3.3 Welding screens are required to protect adjacent workers from exposure to non-ionizing radiation. Adjacent workers are required to wear appropriate eye protection where screens are not feasible. Welder's assistants or anyone working in the screened area must wear appropriate eye protection.

14.4 Contractors
It is suggested that UM Planning and Construction (P&C) take the lead in making sure that this chapter is provided to all contractors, their employees, agents and subcontractors (contractors) to ensure all contractors follow the ‘UM Hot Works Program (ref. Chapter 14 of UM Safety Manual). EHRM and P&C will communicate with all campus departments that may use contractors occasionally to ensure that these contractors also abide by this program as well.

14.5 Training
Required training will provided annually or whenever conditions or the program changes.
14.6 Emergency/After Hours Work

Employees may be called in after hours or on weekends to deal with water line breaks/leaks or other emergencies. Where a supervisor is not available to issue the hot work permit, the employee doing the work may proceed without a permit but must follow the Required Precautions Checklist. The goal is to reduce fire danger to as great an extent as possible while not impeding the completion of emergency repairs.

14.7 Documentation of Standard Procedures in Lieu of a Hot Work Permit

Soldering pipes is the most common hot work done at the University of Montana. It represents the same risk as welding and grinding but in a much smaller area of concern. A well trained plumber who uses heat shields as appropriate, checks the immediate area where the work is done and is able to recognize risks adjacent to the area where soldering is done can and has done this sort of work safely at The University of Montana for many years.

Individual shops who develop and document training of employees for fire safety practices to be used in the course of soldering pipes may, upon review by Environmental Health and Risk Management, gain an exemption from the requirements to use a Hot Work Permit in normal plumbing operations. The training and documentation must be reviewed at least annually by EHRM staff and found acceptable for the exemption to remain in effect. A fire safety kit will be immediately available (within easy reach) whenever soldering is done when combustible or flammable materials are present. The kit shall contain, at a minimum, a fire extinguisher and heat shield(s) suitable for the task at hand.
14.8 APPENDIX A

14.8.1 Definitions

A. **Hot Work** refers to any job activity that uses or produces flames, sparks or heat that could act as an ignition source for any flammable liquid, gas or other combustible material in the area.

B. **Fire Watch** refers to having one or more people on the hot work job whose only purpose is to prevent a fire from starting from hot work performed in areas that are not designated as hot work areas or if any of the following conditions exist:

- Noticeable combustible materials, in building construction or contents, are closer than 35 feet to the point of operation or are easily ignited by sparks;
- Wall or floor openings within a 35-foot radius exposes combustible material in nearby areas, including concealed spaces in walls or floors;
- Combustible material are adjacent to the opposite side of material partitions, walls, ceilings or roofs and are likely to be ignited by conduction or radiation;
- The above are concerns when welding, cutting or grinding are done. The need for a fire watch is greatly reduced or eliminated when soldering pipe joints or similar work, provided heat shields are used as necessary and the work is inspected by the trained individual doing the work, approximately 30 minutes after the flame is extinguished.

C. **Fire Watcher** refers to person or persons who look for potential fires in all exposed areas during hot work and put out fires that are within the limits of the available fire extinguishers.
14.9 APPENDIX B – Hot Work Permit

Next two pages:

- Part I – FORM
- Part II - Display Sign
The University of Montana
Safety Manual - Chapter 14

HOT WORK PERMIT

All temporary operations involving open flames or producing heat and/or sparks require a Hot Work Permit. This includes, but is not limited to, Brazing, Cutting, Grinding, Soldering, Thawing, and Welding.

THIS PERMIT IS GOOD FOR ONE DAY ONLY

Instructions for Fire Safety Supervisor
1. Verify precautions listed at right (or do not proceed with the work)
2. Complete page 1 and retain for job file
3. Post page 2 if in Public Area

Date ________________________  W.O.# ________________________

Location/Bldg. and floor ________________________

Description of work being performed ________________________

Name of person doing hot work ________________________

The above location has been examined, the precautions checked on the Hot Work Checklist have been taken to prevent fire, and permission is authorized for work.

Signed: ________________________
(Permit authorizing individual)

Signed: ________________________
(Person doing hot work)

Time Started:
Date: ___________ Time: ___________ AM/PM

Time Completed:
Date: ___________ Time: ___________ AM/PM

Fire Watch Signoff
Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found safe.

Signed: ________________________

Final Checkup (minimum of 30 minutes)
Work area was monitored for ________ hour(s) Following hot work and found fire safe.

Signed: ________________________

OK HOT WORK CHECKLIST NA
☐ Sprinklers, hose streams and extinguishers in service/operable.
☐ Hot work equipment in good condition.

REQUIREMENTS WITHIN 35 FEET OF WORK
☐ Dust, lint, debris, flammable liquids and oily deposits removed, floor swept clean.
☐ Explosive atmosphere in area eliminated.
☐ Combustible floor wet down, covered with damp sand or fire blankets.
☐ Fans isolated or shut down.
☐ Remove flammable and combustible material where possible. Otherwise protect with fire blankets, guards or metal shields.
☐ All wall and floor openings covered.
☐ Walkways protected beneath hot work.

WORK ON WALLS OR CEILINGS
☐ Combustibles moved away from other side of wall.

WORK IN CONFINED SPACES/ENCLOSED EQUIP.
☐ Confined space cleaned of all combustibles.
☐ Enclosed equipment cleaned of all combustibles.
☐ Containers purged of flammable liquids/vapors.

FIRE WATCH/HOT WORK AREA MONITORING
☐ Fire watch will be provided during and for 30 minutes after work, including breaks.
☐ Fire watch is supplied with suitable extinguisher.
☐ Fire watch is trained in use of this extinguisher and in sounding alarm.
☐ Fire watch may be required for opposite side of walls, above, and below floors and ceilings.

OTHER PRECAUTIONS TAKEN
☐ Confined space or Lockout/Tagout required.
☐ Area smoke or heat detection has been disabled.
☐ Other.

Last update: December 2014 – Environmental Health & Risk Management
WARNING

HOT WORK IN PROGRESS

WATCH FOR FIRE!

WARNING!

IN CASE OF AN EMERGENCY:

CALL: U of M POLICE DEPT.

AT

4000

Post if Hot Work occurs in a Public Area
14.10 APPENDIX C

14.10.1 Fire Safety Precautions for Hot Work

The following precautions should be taken before hot work begins:
1. Establish whether or not it is practical to move the work to a safer location.
2. Clear the area surrounding the work of hazards up to a 35-ft radius.
4. Where practical, stop other operations and processes involving flammable or combustible material.
5. Where practical, remove all flammable or combustible material from the work area; do not just seal the containers.
6. Cover combustible and flammable materials that cannot be removed with fire resistant material, and isolate the area with welding curtains, if practical.
7. Close all manhole covers or other openings in vessels that contain flammable liquids in the area.
8. Remove or protect all cylinders containing compressed gases in the area.
9. Close all doors and fire doors to prevent sparks from escaping.
10. Make sure automatic sprinkler protection is in service and fully operational, if available.
11. Keep hot work equipment in good repair. Check all hoses and their attachments for cracks and leaks.
12. When performing hot work on walls and ceilings, move combustibles away from the opposite side.
13. Evaluate all sewers within 50 ft. of the work area for the possibility of flammable vapors.
14. Isolate the hot work or ignition source work site from other hazardous areas. Close doors, seal cracks in walls, floors, and doors, and seal trenches.
15. Prohibit chlorinated solvents from use in or adjacent to all welding operations. Decomposition products such as phosgene can be formed as a result of the reaction of these solvent vapors with the radiation energy produced during welding operations.

Other alternatives to hot work should be considered if
- Processes involving flammable liquids, gases and dusts cannot be shut down and made safe.
- Partitions, walls, ceilings or roofs have combustible coverings; for example, expanded plastic insulation.
- Partitions are made of combustible sandwich-type construction.
- Pipe or other metals can conduct enough heat to ignite nearby combustibles.
- Large amount of combustible materials is difficult to move or cover such as roll paper, Missoula Collegeton or jute storage.
## 14.11 APPENDIX D

### 14.11.1 Recommended Shade Numbers for Various Welding Processes

<table>
<thead>
<tr>
<th>WELDING PROCESS</th>
<th>SHADE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxy-Acetylene Welding and Cutting</td>
<td>4-5</td>
</tr>
<tr>
<td>Shielding Metal Arc Welding</td>
<td></td>
</tr>
<tr>
<td>3/32” to 1/8” electrode</td>
<td>10</td>
</tr>
<tr>
<td>3/32” to 1/8” electrode</td>
<td>12</td>
</tr>
<tr>
<td>Gas Metal Arc Welding</td>
<td></td>
</tr>
<tr>
<td>Non-ferrous metal</td>
<td>11</td>
</tr>
<tr>
<td>Ferrous metal</td>
<td>12</td>
</tr>
<tr>
<td>Gas Tungsten Arc Welding</td>
<td>12</td>
</tr>
<tr>
<td>Flux-Cored Arc Welding</td>
<td></td>
</tr>
<tr>
<td>Non-ferrous metal</td>
<td>11</td>
</tr>
<tr>
<td>Ferrous metal</td>
<td>12</td>
</tr>
<tr>
<td>Plasma Arc Cutting</td>
<td>9-12</td>
</tr>
</tbody>
</table>
### APPENDIX E

#### 14.12 Respiratory Protection Guidelines for Some Welding Processes

<table>
<thead>
<tr>
<th>Welding Process</th>
<th>Shop Welding</th>
<th>Field Welding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Ventilation Good:</strong></td>
<td><strong>Ventilation Poor:</strong></td>
</tr>
<tr>
<td></td>
<td>Exhaust vent is used to capture fumes and gases</td>
<td>Vent cannot be used due to physical or process restrictions</td>
</tr>
<tr>
<td></td>
<td>Open area spark enclosure, or inside vessel with excellent air movement</td>
<td>Spark enclosure or inside vessel with poor air movement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Welding Process</th>
<th>Shop Welding</th>
<th>Field Welding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shielded Metal Arc Welding</strong></td>
<td>Carbon Steel: Not Required</td>
<td>Carbon Steel: Not Required</td>
</tr>
<tr>
<td></td>
<td>Other Alloys: Not Required</td>
<td>Other Alloys: Fume mask required</td>
</tr>
<tr>
<td><strong>Arc Cutting or Gouging</strong></td>
<td>Arc cutting in shop not recommended; see field welding requirements</td>
<td>Fume mask required except for open plant areas</td>
</tr>
<tr>
<td></td>
<td>Oxy-Acetylene Torch Cutting: Not Required</td>
<td>Oxy-Acetylene Torch Cutting: Not required except for galvanized</td>
</tr>
<tr>
<td></td>
<td>Plasma Arc Cutting: Air supplied respirator required for all plasma arc cutting</td>
<td>Plasma Arc Cutting: Air supplied respirator required</td>
</tr>
<tr>
<td><strong>Gas Metal Arc Welding</strong></td>
<td>Not Required</td>
<td>Not Required</td>
</tr>
<tr>
<td><strong>Gas Tungsten Arc Welding</strong></td>
<td>Not Required</td>
<td>Air supplied respirator required</td>
</tr>
</tbody>
</table>
14.13 APPENDIX F – Hot Work Program ‘TOOL BOX’ Kit

Both the UM Plumbing Shop and the HVAC Technician Shop will have available for each shop member a complete Hot Work Program TOOL BOX that includes the following:

- Fire Blanket
- Fire Extinguisher
- Small flexible sheet of metal (similar in size as a license plate)
- Non-Flammable spray solution and bottle
- 4-5 gallon bucket with lid
- Hot Work Permit