DALHOUSIE UNIVERSITY

ENVIRONMENTAL HEALTH AND SAFETY OFFICE

Hot Work Program

Version: EHS-IND-PROG-004.01
Date: 2024-10-16

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Contents

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1. Introduction, Purpose, and Scope

1.1 Introduction

Hot Work creates hazards and risk to Dalhousie faculty, staff, and students, as well as Dalhousie Infrastructure. The University is committed to providing and promoting a safe and healthy environment to all faculty, staff, and students, as well as the broader community where the University resides.

1.2 Purpose

The Purpose of this program is to Minimize the potential risks of injury and property damage due to hot work.

1.3 Scope

This program outlines the requirements for hot work procedures which take place at the university. This program applies to all faculty, staff, students, contractors, subcontractors, and consultants who may engage in hot work on Dalhousie University Campuses.

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1.4 Definitions

"Hot Work" – Work which creates heat spark or flame, including but not limited to cutting, welding, soldering, brazing, grinding, adhesive bonding, roofing operations, thermal spraying, and thawing pipes.

"Designated Hot Work Area (DHWA)" - An area free of combustible and flammable contents, and includes walls, ceilings and floors being of non-combustible construction, or adequately lined with non-combustible materials or a space designed for hot work by a professional engineer.

"Hot Work Permit (HWP)" - A permit which is completed when hot work takes place outside of a DHWA.

"Hot Work Safety Team" – A group consisting of three roles (permit issuer, hot work operator, fire watch) which ensure safe hot work operation.

"Fire Watch" - Assignment of a person or persons to an area for the express purpose of notifying the fire department, building occupants, or both of an emergency; preventing a fire from occurring; extinguishing small fires, or protecting the public from fire or life safety dangers.

"Hot Work Operator" – The person who performs a hot work task such as welding and grinding.

"Permit Issuer" – The person who completes and issues a hot work permit to the hot work operator and fire watch.

"Permit Issuing Authority (PIA)" – Authority granted to persons, contractors, subcontractors, or consultants to issue a hot work permit.

"Fire Safety System" – A selection of devices designed to detect, signal, and suppress fires. Include smoke detectors, sprinkler systems, heat detectors, etc.

"Combustible" – Able to catch fire and burn easily.

"Non-combustible" – material which will not easily burn or catch fire which provides a degree of fire safety.

"Shielding" – a non-combustible material which can be used to protect a combustible material, or opening to an adjacent space, from sparks, flame, and heat.

2. References

There are several regulatory requirements related to performing hot work safely. The university will meet or exceed industry best practice and the requirements of:

1) The Nova Scotia Occupational Health and Safety Act
2) The National Fire Code of Canada 2015
3) The Nova Scotia Fire Safety Act
4) The Nova Scotia Fire Safety Regulations
5) CSA 117.2 “Safety in Welding, Cutting and Allied Processes”

3. Roles and Responsibilities

3.1 Senior University Administration

- Ensure the Hot Work Program is implemented at Dalhousie University.
- Ensure that adequate resources are available for the implementation of the Hot Work Program.
- Support the Requirements of the Hot Work Program.

3.2 Environmental Health and Safety Office

- Ensure the hot work program meets all legislative requirements.
- Provide technical advice on hot work and hot work training to the university.
- Review and update the hot work program as required.
- Review and update the hot work permit as required.
- Audit compliance with the hot work program.

3.3 Facilities Management

3.3.1 Assistant Vice President

- Review and aid in the administration of the hot work program.
- Ensure resources are available for the program to be administered.

3.3.2 Human Resources (FM)

- Retain worker training records as required.

3.3.3 Project Managers

- Be Familiar with the requirements of the hot work program.
- Ensure contractors hot work meets or exceed Dalhousie's Hot Work Programs requirements.
- Ensure the requirements of the hot work program are communicated to contractors, subcontractors, and consultants.
- Inform contractors, subcontractors, and consultants of situations where fire watch requirements will be required to exceed the minimum requirements of the hot work program.
- Communicate requirements to contractors regarding impairment of fire safety systems and ensure the requirements of section 9 are met.
- Monitor contractor compliance with the hot work program.
- Ensure adequate records of hot work permits are retained.

3.3.4 Supervisors and Forepersons

- Ensure that pre-job hazard assessments consider the use of hot work.
- Ensure that adequate personnel are available for fire watch when hot work is required.
- Ensure that hot work permits have been issued when hot work is required.
- Ensure workers engaged in hot work as the operator or the fire watch have the required training for their tasks.
- Ensure that anyone who reports to them who issues a hot work permit has been designated as competent in writing.
- If impairment of fire safety systems are identified as required on the permit, ensure the requirements in section 9 of the hot work program are met.
- Ensure all required PPE for hot work is made available for employees.
- Retain Copies of hot work permits that have been issued and completed for a period of not less than 2 years.

3.3.5 All Other Facilities Management Staff

- Be familiar with and work in compliance with the hot work program.
- Ensure that pre-job hazard assessments consider the use of hot work.
- Use all required PPE.
- Only issue a hot work permit if you have been deemed competent to do so.
- Only engage in hot work tasks when properly trained.
- Only perform fire watch when properly trained.
- Only engage in hot work when a permit has been issued, or when work takes place in a DHWA.

3.4 Contractors and Consultants

- Be familiar with the hot work program, and ensure it is communicated to all their employees and subcontractors.
- Ensure that hot work carried out on Dalhousie property meets the minimum requirements set forth in Dalhousie's hot work program.
- Ensure those engaged in hot work are trained for their tasks.
- Supply fire extinguishers and other fire suppression equipment as required.

3.5 All Other University Personnel

- Follow the requirements set forth in the hot work program.
- Ensure anyone performing hot work has the appropriate training.
- Ensure anyone performing fire watch has the appropriate training.
- Ensure anyone issuing hot work permits has the appropriate training and is competent to do so .

3.6 Hot Work Permit Issuers

- Ensure the hot work permit is completed and communicated to the hot work operator and fire watch personnel.
- Ensure that hazard and risk assessments have been completed.
- Ensure that any fire safety system impairment procedures are implemented.
- Ensure fire risks are identified on the permit, and appropriate controls will be put in place.

- Ensure that the hot permit or hot work signage is posted at the hot work area, or another location if applicable. (It is permissible to allow the operator or fire watch personnel to post the permit/signage)
- If the permit will last longer than the permit issuer's shift, ensure that adequate instructions are provided for hand-over to the next person responsible for the hot work, to ensure that the completed permit is signed-off appropriately. (depending on the situation the fire watch or operator may complete the final sign-off)

3.7 Hot Work Operators

- Only engage in hot work they are authorized and competent to perform.
- Use all required PPE.
- Review and sign-off on hot work permits.
- Post a copy of a hot work permit or signage at the work area.
- Implement controls outlined on the hot work permit.
- Only perform hot work when a permit has been issued, or the work takes place inside a DHWA.

3.8 Fire Watch Personnel

- The primary duty of fire watch must be monitoring for fires.
- Stop hot work if conditions change, and the precautions need to be reevaluated.
- Review and sign-off on the hot work permit.
- Extinguish small fires if it is safe to do so.
- Activate emergency response systems as required.
- Sign-off on the permit following completion of the fire watch duration.
- Perform final inspections as required by the permit.

4. Designated Hot Work Area's

Designated Hot Work Area's (DHWA) shall be used for hot work whenever possible. A DHWA is an area free of combustible and flammable contents, and includes walls, ceilings and floors being of non-combustible construction, or adequately lined with non-combustible materials. A DWHA may also be a space which has been designed by a professional engineer for the purposes of conducting hot work.

5. Permits

Dalhousie will operate under a permitting system for hot work. Appendix A contains the current version of the hot work permit. Permits are to be completed by a competent person known as the permit issuer. The permit, or permit signage is to be displayed near the hot work area for the duration of the work, and the subsequent fire watch. The Permit Issuer may designate an alternate location for posting of the permit, such as job safety boards, if posting near the work area is not practicable nor beneficial, instead using permit signage at the work area.

5.1 Permit Required

Permits are required for all hot work that is conducted outside of a DHWA. Permits are not required for work that takes place within a DWHA. Permits are also not required for low-risk hot work operations described in section 8. Permits cannot last longer than 24 hours.

5.2 Permit Issuer

The Permit Issuer is required to complete the hot work permit and ensure that both the fire watch and the hot work operator understand and sign off on the permit. The Permit Issuer must retain a copy of the permit and provide a copy to the hot work operator or fire watch. The Permit Issuer must have the relevant skills, experience, training, and knowledge of the work area and its hazards to issue the hot work

permit. In rare cases (such as teaching labs on the engineering campus) it will be acceptable for the hot work operator to also be the permit issuer.

5.3 Permit Holders

The hot work operator and fire watch personnel (the permit holders) are responsible for posting their hot work permit or permit signage at or near the entrance to their work site, or at another location specified by the permit issuer. The permit holders are required to leave the permit or signage posted for the duration of the hot work and the subsequent fire watch period. Fire watch must remove the posted permit or signage on completion of the fire watch duties.

6. Fire Watch

6.1 Fire Watch Requirements

Fire watch is required if work cannot be completed within a DHWA, or if adequate clearance from combustible and flammable materials cannot be maintained. Adequate clearance is 15m.

The minimum requirements for fire watch are:

- Continuous fire watch for the during the hot work operation.
- Fire watch for a period not less than 60 minutes following the hot works completion.
- A final inspection 4 hours after completion of the work, or immediately following the completion of the fire watch, requiring a more comprehensive inspection. This comprehensive inspection may include some, or all of the following:
    - the use of thermal cameras,
    - visual inspection of hard to access adjacent areas,
    - visual inspection of areas at risk due to conduction,
    - Disturbance of any material which may allow a spark to smolder,

- and thorough inspection of anything noted as a risk on the hot work permit.

The permit issuer has the authority to require the minimum fire watch requirements set out in this section to be exceeded. The fire watch duration should be based on the task, and the risks which are present. Higher risk work should have higher then the minimum duration fire watch. When Dalhousie is granting permit issuing authority to contractors, consultants, and their subcontractors, Dalhousie can mandate the minimum fire watch requirements the contractors, consultants, and their subcontractors must abide by. This includes the project management group directly specifying to contractors the minimum requirements for fire watch for higher risk activities like torch applied roofing.

6.2 Adjacent Spaces

When shielding according to section 7 cannot prevent the potential of heat, flame, and spark exposure to an adjacent space, fire watch must be employed in this space in as specified in section 6.1. This may mean there needs to be multiple personnel dedicated to fire watch for a single hot work operation, covering adjacent spaces as well as the main work area.

For torch applied roofing, there must be a method in place to monitor the risk of conduction fires in adjacent spaces below the roof. This could include the use of fire watch personnel, visual inspection, thermal camera inspection, or other appropriate measures.

6.3 Fire Watch Personnel

Personnel who are performing fire watch must be adequately trained for the task, see Section 10 for specific training requirements. Fire watch personnel cannot be the hot work operator.

Fire watch personnel must maintain visual contact with the area they are responsible for. One person cannot perform fire watch for multiple areas that they cannot simultaneously visually monitor. For monitoring these adjacent spaces,

additional fire watch personnel must be used. Fire watch personnel's primary duty must be fire watch.

7. Prevention of Fires

When work cannot be completed in a DHWA, efforts must be made to ensure the prevention of Fires. Any combustible or flammable materials within a 15m (50 ft) distance of the hot work must be protected from ignition. This shall be achieved through one of the following methods.

- Removal – Combustible materials can be removed from the hot work area. This provides the greatest reduction in fire risk and is the preferred solution if possible.
- Shielding (or guarding) – Combustible materials can be protected from ignition with the use of non-combustible materials designed for the purposes of preventing ignition.
- Wetting – Combustible surfaces which cannot be removed or protected may be thoroughly wetted to prevent ignition. In many instances this is not practicable as it would cause undue damage to buildings and materials. There must be express permission Facilities Management if building materials will be wetted, to ensure there is no unnecessary damage to Dalhousie infrastructure.
- There shall always be at least one fire extinguisher provided within a hot work area.

7.1 Adjacent Spaces

When adjacent spaces can be exposed to flame, heat or spark, every effort must be made to adequately shield these areas. Openings in walls, floors or ceilings should be covered or closed to prevent the passage of sparks or open flames to these adjacent spaces. When shielding is not possible or adequate, fire watch must be employed according to section 6.

7.2 Fire Risk from Conduction

Special care should be taken with fire risk due to conduction. Certain building materials can conduct heat to areas which are not in view. Conduction risk must be considered when completing the hot work permit, and controls must be put in place where this risk has been identified. This includes moving combustible materials to no longer be in contact with the material which may conduct heat. Note that welding on metal objects such as pipes have ignited fires a considerable distance from the location of the hot work. Pipe insulation may need to be removed, and fire watch should be positioned appropriately to monitor the risk of fire due to conduction.

Fire risk from conduction for torch applied roofing is covered in section 6.2.

7.3 Fire Watch

As a means of fire prevention, fire watch shall be performed in accordance with section 6 when hot work is performed on Dalhousie property when:

- The hot work takes place outside of a DHWA and/or
- Adequate clearance from combustibles (15m) cannot be maintained.

8. Low-Risk Hot Work

Although tasks may meet the definition of hot work, they are of low enough risk that these tasks do not need to be subject to hot work procedures (permitting and fire watch). Although these tasks are exempted from the hot work procedures, precautions should still be taken. Always follow manufacturer instructions for equipment and maintain adequate distance from combustible materials. For workers in labs, it is recommended to wear cotton, or FR rated lab coats when operating equipment that produces an open flame or significant heat. The following equipment can be operated without completing hot work permits and employing fire watch:

- Bunsen burners
- Heating mantels
- Hot plates

- Soldering irons used for electronics
- Drying ovens
- Electric heaters
- Space heaters

9. Hot Work Requiring the Defeat or Disabling of Fire Protection Systems

The permit issuer must review the need to disable, impair, or defeat a fire safety system to avoid activating the fire safety system when completing hot work. If appropriate shielding of fire protection systems is possible that is the preferred method of defeat. If shielding is not an option, then systems will need to be made inoperable, either by removal or shut-off at the panel. If any part of a buildings fire protection system is made inoperative for more than 2 hours:

- The fire department must be notified and,
- A sufficient number of trained people must patrol the building until the fire protection system is restored to operating condition.

If a sprinkler system, or part of a sprinkler system, is made inoperative for more than 6 hours, procedures to provide protection to the building must be developed and implemented.

It is critically important that correct impairment procedures be followed, and anything that has been impaired must be restored to normal working order upon job completion.

10. Specialized Hot Work Precautions

Certain hot work situations or processes require specialized precautions. The following sections detail precautions to be taken for each process or situation.

10.1 Piping

When hot work must be performed on piping systems, the piping systems should be verified as purged and empty with blocking in place whenever possible. Hot work must not be performed on piping containing flammable, combustible, or dangerous goods until they have been cleaned and tested with a gas detector to ascertain that they are free of explosive vapours, or if safety measures are taken in conformance with good engineering practice.

Note that welding on pipes have ignited fires a considerable distance from the location of the hot work due to conduction. Insulation may need to be removed and fire watch should be positioned appropriately to monitor the risk of fire.

10.2 Containers

Hot work shall not be performed on totally enclosed containers. Hot work must not be performed on containers containing flammable, combustible, or dangerous goods until they have been cleaned and tested with a gas detector to ascertain that they are free of explosive vapours, or if safety measures are taken in conformance with good engineering practices.

10.3 Pressure Vessels

Hot work shall be performed on pressure vessels only by those with a Boiler and Pressure Vessel (BPE) contractor license number, a valid BPE permit (unless part of Dalhousie's regular QA program), and any other relevant certifications that are required such as pressure welding licensing.

10.4 Tunnels

Any hot work taking place in Dalhousie's tunnel system requires extra care during the permitting and hazard assessment process. Risks of depleted oxygen, respiratory hazards, and temperature hazards may be increased in a tunnel environment. Adequate controls such as ventilation, signage, and gas monitoring may be required based on a pre-job hazard or risk assessment.

10.5 Outdoor Hot Work

Hot work which takes place outdoors must consider the fire conditions at the time of work. Foliage is a combustible material, and controls should be put in place to prevent the ignition of foliage or trees. Every effort should be made to keep significant distance from trees when performing hot work. When there is elevated fire risk in the province (signalled by burn bans) additional controls should be considered including the wetting down of foliage at a frequency which adequately reduces the risk of ignition.

11. Training

The following training requirements for members of the hot work safety team must be met. Any Dalhousie employee who is a member of a hot work safety team (permit issuer, hot work operator, or fire watch personnel) is required to complete the fire safety training course, which is offered through the Faculty of Open Learning and Career Development (FOLCD) and fire extinguisher training. In addition to the training requirements listed below, the permit issuer must be knowledgeable enough about the tasks and work area to be considered competent. The hot work operator must be competent for their task and have any certifications that are relevant to ensure regulatory requirements are met.

11.1 Permit Issuer

- Fire Safety Training (FOLCD)
- Fire Extinguisher Training

11.2 Hot Work Operator

- Fire Safety Training (FOLCD)
- Fire Extinguisher Training

11.3 Fire Watch Personnel

- Fire Safety Training (FOLCD)

- Fire Extinguisher Training
- Training specific to the fire extinguishing method to be used other than fire extinguishers if applicable. (e.g. Hose, activation of a suppression system)

12. Review

This program will be evaluated whenever necessary, and intervals no longer than 3 years.

Date	Revision Notes	Published/Reviewed by
2024-10-16	Updated permit design, Updated review section.	Joshua Smith

Appendix A: Hot Work Permit

EHS-IND-FORM-001.01

DALHOUSIE UNIVERSITY | ENVIRONMENTAL HEALTH AND SAFETY OFFICE | FACILITIES MANAGEMENT

Hot Work Permit

This permit is valid for 24hrs, or until final inspection is completed.

Permit Issuer: _____

Contact Number: _____

WO#: _____

Date: _____ Time: _____

LOCATION INFORMATION

Building: _____ Floor: _____ Room: _____

Street Address: _____

Type of work to be performed: ☐ Welding ☐ Cutting ☐ Grinding ☐ Brazing ☐ Torching ☐ Soldering

☐ Other (please specify): _____

Description of Work: _____

FIRE RISK ASSESSMENT

Please select applicable risks: ☐ Combustible Material Within 15m ☐ Exposed Adjacent Spaces ☐ Combustible Dusts
☐ Containers or Piping ☐ Conduction Fires ☐ Hard to Access Adjacent Areas ☐ Impairment of Fire Safety Systems
☐ Possible Flammable Atmosphere ☐ Work to Take Place in Tunnels ☐ Work to Take Place in Confined Space
☐ Work is Outdoors or spark, heat or flame may reach an outdoor area ☐ Work takes place on a roof ☐ Pressure Vessels

☐ Other (please specify): _____

Please select controls: ☐ Relocating Combustible Material ☐ Shielding Combustible Material ☐ Shielding spark, heat, and flame from adjacent areas ☐ Wetting of Combustible Material ☐ Multiple Fire Watch Personnel ☐ Cleaning and Purging
☐ Gas monitors used to test atmospheric conditions ☐ Fire Safety System Impairment procedures ☐ Additional Ventilation

☐ Other (please specify): _____

FIRE WATCH REQUIREMENTS (Please select all that apply)

Fire watch duration following completion of Hot Work: ☐ 1 hour ☐ 2 hours ☐ 4 hours ☐ Other specified time: _____

Final inspection: ☐ To be completed immediately upon fire watch completion (DETAILED INSPECTION)
☐ To be completed 4 hours after fire watch completion ☐ Other Specified Time: _____

Fire suppression equipment used by fire watch: : Fire Extinguisher ☐ A ☐ B ☐ C ☐ D ☐ K ☐ Fire Hose
☐ Procedure for Contacting Emergency Services in Place ☐ Other: _____

FIRE WATCH PERSONNEL AND CONTACT (cell phone number if applicable)

Name: _____ Contact: _____

Name: _____ Contact: _____

Name: _____ Contact: _____

PERMIT SIGN-OFF

The following persons have reviewed this permit, relevant hazard and risk assessments, and relevant programs, policies, and procedures.

Permit Issuer: _____ Hot Work Operator: _____

Fire Watch: _____

PERMIT CLOSE OUT

Please sign this section following the completion of a final inspection, and completion of any follow-up actions. This includes ensuring fire safety systems are returned to full working condition with any and all guards or shielding removed.

Name: _____ Signature: _____ Date: _____

DALHOUSIE UNIVERSITY

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Appendix B: Hot Work Signage.

WARNING

Hot Work in Progress
Risk of fire

Date and Time:_____

Contact: _____