Attachment B

Hot Work Permit

Hot Work Permit
2021

I&DS Health & Safety
Safe Working Procedure

SP 13

Purpose

The purpose of this procedure is to outline minimum requirements for when Hot Work is being performed by employees or contractors (see items 38-40) on City property, at facilities or when Hot Work can affect City personnel, property, facilities and/or equipment.

Hazards

• Heat, Fire, Explosion • Hazardous Atmosphere • Noxious gases and fumes • Flying debris/hot sparks	• Failing to identify and isolate or remove flammable/combustible substances/materials • Lack of, or inadequate, fire watch during or following Hot Work

Scope

1. City staff, contractors, and subcontractors require a **valid, authorized Hot Work Permit** for: **Hot Work** - defined as work involving open flame, producing hot surfaces and/or generating sparks or molten material. This includes, but is not limited to, welding, cutting, soldering, brazing, grinding, torch-applied roofing, adhesive bonding, thermal spraying, thawing pipes and the use of non-explosion proof equipment or tools.
   - For ignition-sensitive materials (such as low-flash point ignitable liquids, flammable gas/vapour, and some combustible dusts) it can also include the use of lighting and communication equipment that is not intrinsically safe, drilling, chiseling, sand blasting, hot-air blowers, and ungrounded personnel or equipment.

   The above requirement includes:
   a) **High-risk Locations** made hazardous by the presence of:
      i. Flammable gases or vapours that may be present in the air in quantities sufficient to produce an explosive or ignitable mixture
      ii. Combustible or electrically conductive dust, or easily ignitable fibers or flyings
      iii. Substances/materials that may explode, or that can become easily ignited (includes a "hazardous room" as defined by the O. Reg. 67/93, s. 18.)
   b) **Places or Equipment identified** by the City of Toronto as requiring Hot Work Permits:
      iv. Identified Hot Work Locations include confined spaces, digester buildings with associated areas, gas control buildings, flammables or combustibles storage or handling areas (e.g. hazardous waste depot, fuelling station, warehouses, etc.) or other locations as may be applicable
      v. Identified Hot Work on Equipment - an assessment shall be made by the designated management personnel responsible for the work, when Hot Work is to be performed on or around equipment which has been potentially

contaminated with flammable or combustible solids, liquids, vapours or dust. This may apply to heavy equipment (such as loaders, bulldozers, tractor trailers, trucks, etc.) and vessels/containers, drums or pipes.

2. **A permit is <u>not</u> required when Hot Work is performed within a designated and purposefully built facility** (e.g. a welding or maintenance shop) while combustible, ignitable, or flammable materials remain controlled or safeguarded (e.g. combustible materials stored in metal cabinets, and ignitable and flammable materials in approved storage cabinets for flammable and combustible liquids).
   NOTE: Outdoor locations may require a permit where combustible construction and combustible material (yard storage, etc.) may be present.

General Requirements

3. **Avoid Hot Work whenever possible.** Consider using alternative cold work methods (examples below), or relocating the work to a Hot Work designated area/facility.

<u>Instead of:</u>	**<u>Use cold work methods:</u>**
• Saw or torch cutting	• Manual hydraulic shears
• Welding	• Mechanical bolting
• Sweat soldering	• Screwed or flanged pipe
• Torch of radial saw cutting	• Mechanical pipe cutter

NOTE: **Do not perform Hot Work when the fire protection system (if present) is impaired.**

4. Supervisors shall evaluate work operations, machinery and equipment to determine appropriate application of this Hot Work Permit procedure, and develop written safe work procedures as needed for specific tasks, particularly for unusual or unique situations. Consult with work crews, Joint Health and Safety Committees, People & Equity Occupational Health and Safety staff, if required.
5. Locations known/identified to require Hot Work permit shall have appropriate signage (see Section 8).
6. Supervisors shall provide instructions to workers prior to commencing work on the potential fire/explosion hazards, and plan a safe course of action to be followed, including emergency response provisions.
7. Prior to signing the permit and initiating work, the Supervisor (or designated person) is responsible for verifying that the necessary precautions are implemented:
   a. If a designated person takes on this role, the Supervisor shall ensure the designated person has all necessary competency and authority to adequately manage the Hot Work
   b. **Minimum precautions** to be observed (see listed in the Hot Work Permit):
      - Ensure the Hot Work area, and the equipment/material to be worked on are free of combustible materials and accumulations:
        - **Thoroughly clean** debris, dust/lint, or residues, and pooling of ignitable liquid (due to spills or leaks)

- Look for accumulations in spaces hidden from sight, such as trenches or pits, underneath equipment, within partially-enclosed equipment, and atop cable trays, ductwork, or suspended ceilings
- When needed, use wet-down as an additional precaution, not as an alternative, to remove combustibles

- **Ensure all flammable/combustible materials are at least 11 m (35 ft.) away** from the Hot Work area (horizontally and vertically)

  NOTE: Consider extending the Hot Work area to 15 m horizontally when performing elevated work or in windy conditions
- **Cover/shield** any combustible material/equipment that cannot be moved, to protect them from ignition. Cover/shield materials can include sheet metal and/or approved fire/heat-resistant welding pads, blankets or curtains.
- Cover tightly all floor, wall, and ceiling openings within 11 m of the operation to prevent sparks from entering an unobserved area (e.g. penetrations for cables, piping, conveyors, ventilation ductwork, stairways, doors, windows, etc.)
- Cover/close vents, shut-down ventilation and conveying systems to prevent the passage of sparks or flames to adjacent areas (lock-out might be required)
- Do not perform Hot Work on partitions, walls, ceilings or roofs with combustible layers or cores, or on equipment with combustible lining; seek alternative cold work method
- Ensure the Hot Work activity remains confined to the area or equipment specified on the permit, and that the implemented safety precautions remain in place during work
- Verify that fire extinguishing equipment is available in the immediate work area, in good working order and appropriate for the potential type of fire

  NOTE: This extinguishing equipment shall be supplied in addition to any that is already present in the immediate area.
- Check that sprinklers, where provided, are in commission and will not be taken out of service while the Hot Work is being done
- Inspect the Hot Work equipment to ensure it is in good working condition
- Isolate Hot Work area with tape, barricades, etc. and have signage to warn against walking into/under the area

8. Hazard identification shall be provided at or near the Hot Work area to warn others of associated or residual hazards (examples below):

9. The Hot Work operator(s) shall install, maintain and operate the equipment safely, so as not to endanger people or property, in compliance with CAN/CSA-W117.2, *"Safety in Welding, Cutting and Allied Processes"* and the *Ontario Fire Code*
10. The operator(s) shall check that the work area is fire-safe before vacating
11. The operator(s) shall report to the Supervisor any fire occurrence. Any discharged fire extinguisher must be replaced without delay.

12. Should the conditions change, or for conditions not covered by this procedure, the operator shall consult with the Supervisor.

Fire Watch and Monitoring

13. A person other than the operator shall perform Fire Watch duties for Hot Work, including:
    a. Any area where combustible materials used in building construction or contents are located within 5 m of the Hot Work area;
    b. Any area of the building exposed as a result of unprotected roof or wall openings located within 5 m of persons;
    c. Any area where combustibles on the underside of roofs or the opposite side of walls might ignite
14. The Fire Watch must:
    a. Understand the inherent hazards of the Hot Work area and operation
    b. Watch for fire development and hazardous conditions (e.g. stray sparks, smoldering fires, smoke, etc.)
    c. Check the other side of the wall, when Hot Work is performed on or near a wall, as heat might transfer or radiate through the wall
    d. Ensure required precautions remain in place
    e. Have suitable fire-extinguishing equipment readily available and be trained in its use
    f. Know the location of and how to activate the nearest fire alarm
    g. Call or direct someone to call 911 and activate fire alarm before attempting to put out a fire
    h. Stop the Hot Work immediately, if a fire or hazardous condition develops

15. **The Fire watch is required continuously during the Hot Work, and for 1 (one) hour immediately after** the Hot Work ceases (since the vast majority of fires start in this period)

16. **Fire monitoring is required for an additional 3 hours**
    NOTE: More than 3 hours might be needed for combustible construction with unprotected concealed cavities.
    a. The Supervisor can designate a trained person to intermittently tour (at least once every hour, recommended every 15 minutes) the Hot Work area and all adjacent areas (including floors above and below)
    b. Other monitoring methods might include: automatic smoke detection system with remote alarm that sounds in a staffed location; security video cameras with clear coverage of the Hot Work area, re-routing security/maintenance rounds when needed; workers routinely present in the Hot Work area instructed to watch for fire development or hazardous conditions.

17. More than one Fire Watch may be required if the Hot Work area is not visible from a single vantage point:
    a. It is large, multi-level, congested, etc.
    b. It extends to the other side due to an opening or thermally conductive penetration (e.g. metal piping, steel structural members)

18. The Supervisor (or designated person) should conduct a final check of the Hot Work area for fire-safe conditions after the post-work fire watch and/or fire monitoring periods have concluded

The City's Hot Work Permit is an approved tag (see Appendix A for sample) that can be obtained from City Stores.

How to complete the Hot Work Permit

The Hot Work Permit is a two-page form (self-copying) with a back cover:

- Page 1 documents the plan prior to hot work, and must be retained as an indicator of an open Hot Work Permit.
- Page 2 documents each step during and after hot work, and must be posted visibly at the hot work area together with the back cover to alert that active Hot Work is happening.
    - Both Page 1 and 2 include the recommendation to consider alternatives to hot work, information about the work and precautions.
    - On the back cover there are a warning sign and the emergency information.

19. **Permit Authorizer**: if the work cannot be done by other means, or at a Hot Work designated area, then the issuing Supervisor (or designated person) must review and verify implementation of all the applicable safety precautions before signing the permit, then provide Page 2 (and back cover) to the person performing the Hot Work.
20. **Person performing hot work:** must record time started and sign Page 1 and display Page 2 of the permit at hot work area. After hot work is completed, record time and leave Page 2 permit displayed for fire watch. This provides a start time for the post-work fire watch.
21. **Fire Watch:** sign Page 1**,** watch area during hot work and after work completion. Prior to leaving area, perform final inspection, sign Page 2, leave permit displayed and notify Fire Monitor or Permit Authorizer.
22. **Fire Monitor:** monitor area after post-work fire watch completion. Perform final inspection, sign Page 2 and return to Permit Authorizer.
23. Upon completion of the work, fire watch and monitoring, the Supervisor (or designated person) conducts a final inspection of the area and signs off to confirm the area is fire-safe. The Permit Authorizer must review Page 2 including signed confirmation of post-work fire watch and fire monitoring, sign off the final check on Page 2 that the permit is closed out, and retain together with Page 1 for the records.
24. If the job has not been completed by the end of the shift, a new permit shall be issued.
25. Used permits (both pages) should be retained for a minimum of 2 (two) years.

Specific Requirements

Cutting and Welding

26. Cutting and welding operations are to be restricted to authorized, properly trained individuals
27. A properly rated fire extinguisher must be attached to all cutting and welding carts
28. All painted surfaces, which may be welded or cut, must be known to be non-toxic; otherwise the paint must be removed first, or appropriate respiratory protection shall be worn

NOTE: In welding, oxygen and acetylene present the most common hazards of fire and explosion:

- Pure oxygen will not burn or explode, but supports the combustion of other materials, causing them to burn much more rapidly than they would in air
- Never use oxygen to blow dust off of clothing. Oxygen will form an explosive mixture with acetylene, hydrogen, and other combustible gases.

29. Welders should wear flameproof gauntlet gloves, aprons, leggings, shoulder and arm covers, welding helmets, eye and hearing protection. Clothing should be made from fire-rated material, free from oil and grease to be less likely to ignite.
30. To keep out sparks and slag, have sleeves rolled down and collars buttoned up, wear shirts with flaps over pockets, pants with no cuffs and boots secured to the top. Remove rings, watches, and other jewelry, never carry matches or lighters in pockets.
31. Install protective screens or barriers to protect people from arc flash, radiation, or spatter. Barriers should be non-reflective and allow air circulation at floor and ceiling levels.
    a) Where barriers are not feasible or effective, workers near a welding area should wear proper eye protection and any other equipment required.

For more information and specific safety precautions for these operations see Appendix B "*Welding and Cutting"* from Infrastructure Health & Safety Association.

Hot Work in the Presence of Flammable Atmospheres

32. In order to perform Hot Work in the presence of an explosive or flammable gas or vapour, the following precautions must be taken:
    a. The atmosphere in the Hot Work area is continuously monitored for the presence of combustible gas, toxic gas and oxygen deficiency
    b. The space is purged and continuously ventilated to maintain an atmosphere of less than 5% of the LEL and an oxygen concentration of less than 23%; and an adequate warning system and exit procedure must be in place to provide adequate warning and allow safe escape if the levels above are exceeded:
        i. If the LEL exceeds 5%, all Hot Work shall immediately stop and the source of the explosive gas shall be identified, eliminated and purged before work resumes
        ii. Between LEL 5% and 10%, the area shall be evacuated and the source of the explosive gas should be controlled from outside the area (e.g. shutting off gas valves). If it is necessary to control the source inside the high gas area, it shall be done only by qualified personnel wearing all appropriate PPE, grounded and using non-sparking tools.

iii. If the LEL exceeds 25%, the area shall be evacuated and no one shall enter the high gas area. The source of the explosive gas shall be controlled only from outside the area. Call 911 immediately in case of emergency.

33. For safety precautions when working in Confined Spaces, follow I&DS safety procedure SP09:
    a. Workers must wear adequate respiratory protection and equipment to allow persons outside the confined space to locate and rescue them, if necessary
    b. Alternatively, the space must be rendered safe by inerting with an inert gas and continuously monitoring the atmosphere, particularly with regard to oxygen concentration

Hot Work on Empty Tank/Pipe or Equipment

34. For any Hot Work, such as welding or cutting, on a container that may have contained flammable or combustible material, the following minimum precautions must be taken:
    a. Make sure that fittings, such as baffles, will not interfere with cleaning or purging
    b. Drain and clean the container using appropriate methods (e.g. steam cleaning, water down the equipment, etc.)
    c. Test its interior with a gas detector, both before Hot Work begins, and periodically during the work
35. For containers that cannot be drained and cleaned, they must be made safe by purging and inerting with an inert gas, but only if these precautions are taken:
    a. Use recognized procedures and proper equipment, and understand the limitations of the inerting process
    b. Monitor the oxygen level inside the container and maintain levels at essentially zero for the duration of the work
    c. When draining and purging is warranted, ensure all low-points are identified and verified clear
36. Never assume a container is clean or safe, test before any Hot Work begins.

The Regulations for Industrial Establishments (R.R.O. 1990, Reg. 851, s. 78) require that where repairs or alterations are made on a drum, tank, pipeline or other container, it must be drained and cleaned or otherwise made free from any explosive, flammable or harmful substance. See Appendix C - Ministry of Labour *Engineering Data Sheet 4-14 "Welding and Other Hot Work on Containers"*.

Contracted Work

37. Where the contractor is the constructor, the contract should determine safe Hot Work procedures and practices to be followed, as well as the responsibility for training, managing and conducting Hot Work.
38. Where the City of Toronto is the constructor and the contractor/employer, management shall communicate the Hot Work requirements of this procedure to all contractors/contract employees and provide them with Appendix D – *How to Fill-in the Hot Work Permit*. Contractor supervision and workers shall be competent and fully trained to meet or exceed the City's requirements and to perform this work.
39. The City project/facility representatives (as agreed or specified in the contract) must be notified prior to Hot Work, and be provided with a copy of the Hot Work Permit(s).

Training

40. All workers performing tasks related to Hot Work must be trained (e.g. permit authorizers; staff performing Hot Work, fire watch, and/or fire monitoring)
41. Permit authorizers must be competent persons and have received the related training.
42. Hot Work training and instruction must include the following :
    a. Implementation and control of required precautions, and how to escalate any problems identified
    b. Inspection of the Hot Work area for fire-safe conditions, and the emergency response if a fire is detected (e.g. call 911 before attempting to extinguish)
    c. Safe use of the fire extinguisher if expected to use it in response to a fire
    d. The proper use of the Hot Work Permit

NOTE: A refresher is recommended every 3 (three) years.

Legislative Requirements

Occupational Health and Safety Act, RSO 1990
Regulation for Industrial Establishments, Reg. 851
Regulation for Construction Projects, Reg. 213/91
Regulation for Confined Spaces, Reg. 632/05
Fire Protection and Prevention Act, 1997, S.O. 1997, c. 4 and O. Reg. 213/07: FIRE CODE

Standards and Guidelines

Ministry of Labour, Training and Skills Development - Engineering Data Sheet 4-14 "*Welding and Other Hot Work on Containers*"
CAN/CSA-W117.2-12 - *Safety in welding, cutting, and allied processes*

Appendices

Appendix A – Sample Hot Work Permit
Appendix B – Infrastructure Health & Safety Association - "*Welding and Cutting*"
Appendix C – Ministry of Labour, Training and Skills Development - Engineering Data Sheet 4-14, "*Welding and Other Hot Work on Containers*"
Appendix D – "*How to Fill-in the Hot Work Permit"*

Related Safety Policies/Procedures

SP 04	Eye and Face Protection
SP 09	Confined Space Entry
SP 12	Lockout, Tag & Test

Distribution – Infrastructure & Development Services Division Heads, Directors, Managers, Supervisors, People & Equity OH&S/DM Managers and Consultants