ZURICH

RISKTOPICS

Management practices: Hot work – Property and Business Interruption
January 2013

This document highlights the property conservation responsibilities of those who utilize hot work outside of areas specifically designed and intended for such work Additional responsibilities beyond property protection are beyond the scope of this document. This document applies whether the hot work is undertaken by in-house maintenance staff or by contractors.

INTRODUCTION

Global statistics show that hot work causes many fires each year. Whether it is in Great Britain, Finland, or New Zealand, hot work has caused up to 15 percent of workplace fires in recent years. NFPA data shows that more than 2,600 hot work fires occur each year in US industry, causing over $84 million USD in damage. Overall, these indicators are consistent with the global hot work loss experience of Zurich.

Whether associated with new construction, renovations, process changes, or emergency repairs, hot work fires can seriously delay a project or turn a hasty production enhancement into a lengthy business interruption..

DISCUSSION

For the purposes of this document, hot work:

- Is a support operation
- Involves portable equipment
- Introduces a source of ignition
- Is outside an area specifically intended for hot work

Source: Zurich Services Corporation

Support operation

For both construction and maintenance, hot work is used in support of the primary work or activities being conducted.

For a facility under construction, renovation, or demolition, hot work is one of many methods available to assemble or disassemble machines or materials. Welding and torch cutting are familiar examples hot work. Additional examples include: hot riveting, grinding, and heat applied to roof coverings.

For an occupied building, hot work is an activity that is not directly related to the primary business purpose of the location. Instead, hot work is associated with renovations or maintenance.

As a support activity, hot work usually is not routine or repetitive. Often, each operation takes place in a new location, or if the location is the same, the surroundings may change continuously. It is this non-routine characteristic of hot work that requires consistently enforced fire prevention procedures.

Portable equipment
Hot work equipment is portable. Smaller equipment can be hand-carried to a point of use by workers. Examples include soldering irons, soldering torches, and grinders. Larger equipment may be wheel mounted. Examples include oxyacetylene torches with large gas cylinders on a hand truck, or arc welding equipment on a cart.

Portability is the characteristic of hot work equipment that introduces the greatest challenge to the management and control of this activity. Portability allows hot work equipment to be found just about anywhere on a construction site or anywhere on or within a completed building. For example, hot work can occur on ladders, on scaffolding, inside tanks, inside water cooling towers, and on roofs.

Source of ignition
Hot work involves tools and equipment that produce heat or sparks. Examples include exposed flames, ejected hot slag, or a spray of metal sparks from a grinder.

It is this characteristic of producing heat and sparks that introduces a need to relocate or otherwise protect combustibles that may be present in the hot work area.

Areas not intended for hot work
Often, a maintenance shop includes a work area specifically designed and intended for hot work. It is ideal to perform all hot work in these areas. However, when hot work is needed to erect or modify a building or install or repair a piece of machinery, it may not be feasible or realistic to move the work to the shop. In these cases, portable hot work equipment is moved to an area not normally intended for such work.

In accordance with Zurich Best Practice, apply a hot work permit program to any hot work conducted in an area not intended for such work.

Why is a hot work permit program needed?
- Hot work is not routine work
- Hot work equipment is portable and can appear anywhere
- Hot work is a frequent source of ignition
- Hot work is often needed in areas not intended for such work

It is these characteristics that drive the need to carefully assess, control, and manage all hot work.

Hot work and contractors
Zurich data shows that the largest hot work losses have been caused by contractors. Many contractors will frequently bring their own hot work equipment onto a site. It is vital that any contractor on the premises utilize an effective hot work program.

Hot work permit programs apply to all contractors
Always assume any contractor coming onto a site is bringing their own hot work equipment with them.
Require all contractors to use the site's hot work permit program.

Hot work and construction sites
When a construction project begins, the potential for fire is often rather low. Earth moving, underground utility installation and foundation work often involve minimal fire exposure to the building or structure to be erected. However, at some point, combustibles are introduced to a site.

Once combustibles are introduced to a construction site, begin using a hot work permit program in any area where combustibles are present. This includes combustible construction features or combustible contents.

Hot work permit programs and construction projects
The Site Fire Prevention Program should authorize the site Fire Prevention Program Manager to designate Hot Work Permit Required areas. These are areas that possess combustible construction features or combustible contents. Use a hot work permit program in areas that are not designed and arranged to accommodate hot work.

GUIDANCE

Develop a written hot work program tailored to the specific needs of the location. To assist in tailoring the program to the site consider the following items; General Risk Assessment, Establishing Designated Areas, and Evaluating Options for less hazardous methods.

General risk assessment
A sample Zurich Hot Work Permit is shown in Appendix A, and a sample Zurich Hot Work Permit procedure is shown in Appendix B. Recognize that these Zurich documents are generic. These procedures and documents may need to be modified to protect against unique site Hot Work exposures. This includes controls needed to reduce the likelihood and impact of fire or explosion. Appendix C contains a risk assessment framework to assist in evaluation of unique Hot Work exposures.

General risk assessment
It is essential to have the general risk assessment conducted by a person with appropriate knowledge, training, and experience. Specifically, a person who is aware of the hazards associated with hot work.

Establish designated areas
A key component of a Hot Work program is to establish the areas where Hot Work permits are required. An efficient method of completing this is to use the general risk assessment to categorize all site areas with one of the following descriptions. An effective method to communicate these site designations is to plot them on a site map or plan.

- Designated area
- Non-designated area
- Prohibited areas

Note:
Designated areas are permanent places, inside or outside, specifically designed and intended for hot work. Non-designated areas are places where hot work is only allowed when a valid hot work permit is issued.

Prohibited areas are places where hot work is never permitted. Prohibited areas include spaces in or near buildings made of fast burning construction materials such as expanded polystyrene. Another example is an area where flammable or combustible liquids, gases, or dusts are routinely stored and used with no reasonable means is available to remove these materials.

Arrange the hot work permit process to include a review of the work location description. Deny permits to work in prohibited areas.

Evaluate options for less hazardous work methods
Initiate the review of each hot work permit request with a consideration of less hazardous work methods. Confirm that no less hazardous work method is possible.

Less hazardous work methods
Vigorously pursue every effort to avoid hot work. Thoroughly review all possible less hazardous alternatives such as cold work.

Project specific work method statements
Evaluate if the hot work permit alone will provide sufficient control of hazards for the planned work.

The authorizer is responsible to identify when project specific work method statements are needed. Project specific work method statements will identify additional hazard control measures to be applied such as the use of a confined space entry permit or the use of lock-out/tag-out procedures.

Qualified personnel
Require hot work operations to be managed, supervised, and implemented by qualified personnel. Provide initial and periodic retraining for all personnel responsible for hot work operations. Qualified personnel will assume responsibilities such as:

- Authorizer: The person designated by management to authorize hot work
- Supervisor: The person conducting the periodic work area inspections
- Worker: The person conducting the hot work
- Fire Watch: The person or persons posted to monitor the work area for fire
- Fire Watch Lead: The person selected as lead for the fire watch if more than one fire watch is posted

Require contractors to comply with all elements of the hot work program including the training requirements. Verify or provide appropriate training to contractors before they are permitted to perform hot work on site.

Permit process
Use the hot work permit program to manage each hot work activity conducted in non-designated areas. The permit process should incorporate elements including:

- Review of less hazardous work methods
- Project specific work method statements
- Worker qualifications
- Work area risk assessment
- Authorization to perform hot work
- Worker acknowledgement
- Periodic work areas inspections
- Final work area inspection
- Permit close out

Source: Zurich Services Corporation

Each of the above elements is reviewed in detail in Appendix B.

CONCLUSION

Developing and implementing a written hot work permit program is an essential component of facility risk management.

A program for the control of outside contractors should include measures to require permission to bring hot work equipment onto the facility premises, and full compliance with the hot work permit program when hot work is to be performed.

Management should periodically verify that the hot work program is in use for both employees and outside contractors.

Zurich can provide a supply of hot work permits in support of the recommended hot work program described above. Contact your Zurich account team for a supply of permits.

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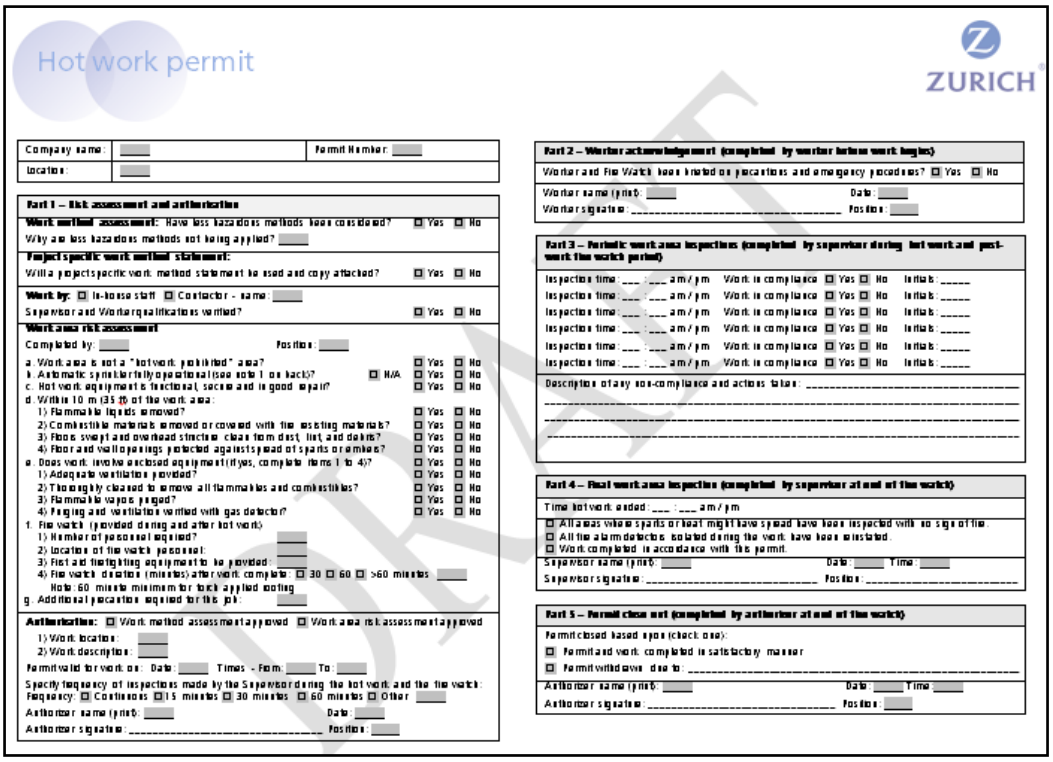
APPENDIX A – ZURICH HOT WORK PERMIT



Hot work permit

ZURICH

Company name:		Permit Number:
Location:		

Part 1 – Risk assessment and authorization

Work method assessment: Have less hazardous methods been considered? ☐ Yes ☐ No

Why are less hazardous methods not being applied?

Project specific work method statement:

Will a project specific work method statement be used and copy attached? ☐ Yes ☐ No

Work by: ☐ In-house staff ☐ Contractor - name:

Supervisor and Worker qualifications verified? ☐ Yes ☐ No

Work area risk assessment

Completed by: Position:

a. Work area is not a "hot work prohibited" area? ☐ Yes ☐ No
b. Automatic sprinklers fully operational (see note 1 on back)? ☐ N/A ☐ Yes ☐ No
c. Hot work equipment is functional, secured and in good repair? ☐ Yes ☐ No
d. Within 10 m (35 ft) of the work area:
1) Flammable liquids removed? ☐ Yes ☐ No
2) Combustible materials removed or covered with fire resisting materials? ☐ Yes ☐ No
3) Floors swept and overhead structure clear from dust, lint, and debris? ☐ Yes ☐ No
4) Floor and wall openings protected against spread of sparks or embers? ☐ Yes ☐ No
e. Does work involve enclosed equipment (if yes, complete items 1 to 4)? ☐ Yes ☐ No
1) Adequate ventilation provided? ☐ Yes ☐ No
2) Thoroughly cleaned to remove all flammables and combustibles? ☐ Yes ☐ No
3) Flammable vapors purged? ☐ Yes ☐ No
4) Purging and ventilation verified with gas detector? ☐ Yes ☐ No
f. Fire watch (provided during and after hot work)
1) Number of personnel required?
2) Location of fire watch personnel:
3) First aid firefighting equipment to be provided:
4) Fire watch duration (minutes) after work complete: ☐ 30 ☐ 60 ☐ >60 minutes
Note: 60 minute minimum for torch applied roofing
g. Additional precaution required for this job:

Authorization: ☐ Work method assessment approved ☐ Work area risk assessment approved

1) Work location:
2) Work description:

Permit valid for work on: Date: Times - From: To:

Specify frequency of inspections made by the Supervisor during the hot work and the fire watch:
Frequency: ☐ Continuous ☐ 15 minutes ☐ 30 minutes ☐ 60 minutes ☐ Other

Authorizer name (print): Date:

Authorizer signature: Position:

Part 2 – Worker acknowledgement (completed by worker before work begins)

Worker and Fire Watch have briefed on precautions and emergency procedures? ☐ Yes ☐ No

Worker name (print): Date:

Worker signature: Position:

Part 3 – Periodic work area inspections (completed by supervisor during hot work and post-work fire watch period)

Inspection time: ___ : ___ am / pm Work is compliance ☐ Yes ☐ No Initials: _____
Inspection time: ___ : ___ am / pm Work is compliance ☐ Yes ☐ No Initials: _____
Inspection time: ___ : ___ am / pm Work is compliance ☐ Yes ☐ No Initials: _____
Inspection time: ___ : ___ am / pm Work is compliance ☐ Yes ☐ No Initials: _____
Inspection time: ___ : ___ am / pm Work is compliance ☐ Yes ☐ No Initials: _____
Inspection time: ___ : ___ am / pm Work is compliance ☐ Yes ☐ No Initials: _____

Description of any non-compliance and actions taken:

Part 4 – Final work area inspection (completed by supervisor at end of fire watch)

Time hot work ended: ___ : ___ am / pm

☐ All areas where sparks or heat might have spread have been inspected with no sign of fire.
☐ All fire alarm detectors isolated during the work have been reinstated.
☐ Work completed in accordance with this permit.

Supervisor name (print): Date: Time:

Supervisor signature: Position:

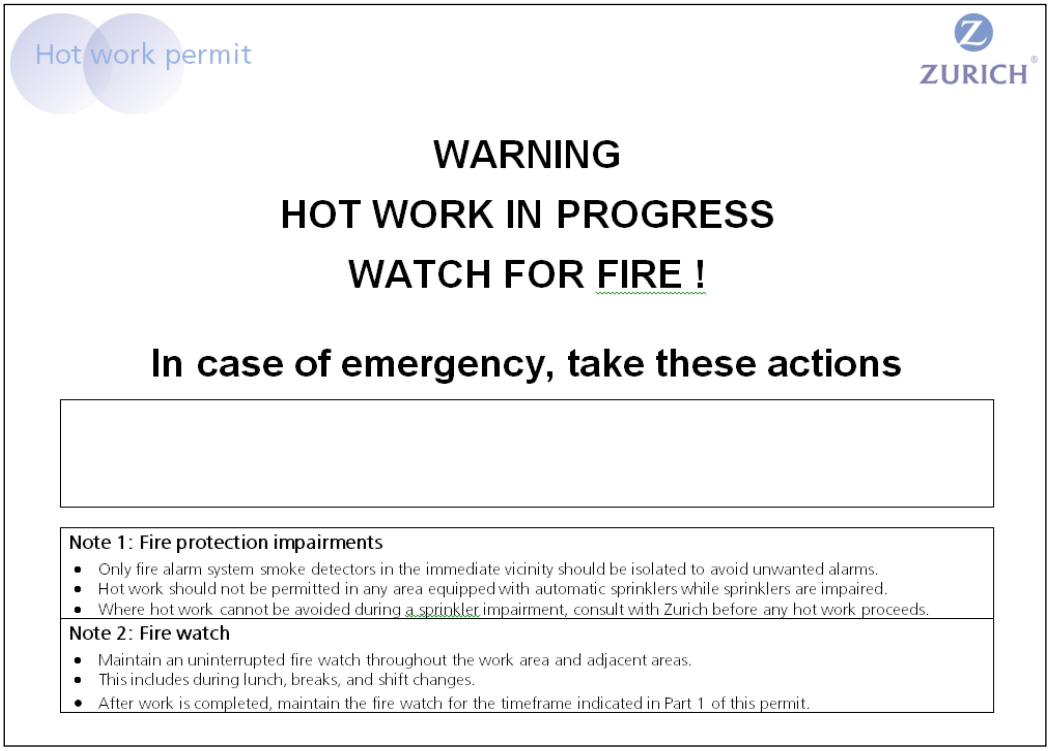
Part 5 – Permit close out (completed by authorizer at end of fire watch)

Permit closed based upon (check one):
☐ Permitted work completed in satisfactory manner
☐ Permit withdrawn due to:

Authorizer name (print): Date: Time:

Authorizer signature: Position:

Zurich Hot Work Permit - Front



Hot work permit

ZURICH

WARNING

HOT WORK IN PROGRESS

WATCH FOR FIRE !

In case of emergency, take these actions

Note 1: Fire protection impairments

- Only fire alarm system smoke detectors in the immediate vicinity should be isolated to avoid unwanted alarms.
- Hot work should not be permitted in any area equipped with automatic sprinklers while sprinklers are impaired.
- Where hot work cannot be avoided during a sprinkler impairment, consult with Zurich before any hot work proceeds.

Note 2: Fire watch

- Maintain an uninterrupted fire watch throughout the work area and adjacent areas.
- This includes during lunch, breaks, and shift changes.
- After work is completed, maintain the fire watch for the timeframe indicated in Part 1 of this permit.

Zurich Hot Work Permit - Back

APPENDIX B – USING THE ZURICH HOT WORK PERMIT

The Zurich hot work permit is a generic permit. As advised in the Guidance section, the content of any hot work permit selected for use at a specific location should be validated through a general risk assessment.

Use of the Zurich hot work permit and permit process
The Zurich hot work permit (Appendix A) and permit process (Appendix B) are offered as generic tools. As discussed in the Guidance section, the content of any hot work permit selected for use at a specific location should be validated through a general risk assessment.

The generic Zurich hot work permit includes the following five parts:

- Part 1 -Risk assessment and authorization
- Part 2 - Worker acknowledgement
- Part 3 - Periodic work area inspections
- Part 4 - Final work area inspection
- Part 5 - Permit close out

The following describes the use and application of each parts of the generic Zurich Hot Work Permit).

Part 1 - Risk assessment and authorization
The intent of Part 1 is that the hot work Authorizer assumes responsibility for the risk assessment and authorization of the hot work operation. While activities such as the work area risk assessment may be delegated to other qualified personnel, such as the hot work Supervisor, the responsibility for the hot work operation cannot be delegated. The Part 1 activities include:

- Work method assessment: Is a less hazardous work method available? The Authorizer is expected to vigorously drive a thorough discussion regarding this question. Do not permit hot work in a non-designated area until it is verified that a less hazardous method is not a suitable.

Less hazardous work methods
Consider:

- Less hazardous work methods to separate materials such as pipe cutters, hydraulic shears, or reciprocating saws
- Less hazardous work methods to joint materials such as threaded, bolted, or flanged connections
- Relocating work to an area designed for hot work.

- Project specific work method statement: Will the use of the hot work permit be sufficient to control hazards associated with the planned work? The Authorizer is responsible to recognize when work will introduce hazards that require controls beyond those addressed through the use of only a hot work permit. In these cases, project specific work method statement will be needed.

Project specific work method statements
Consider specific work method statements for cases such as:

- Work conducted in confined spaces
- Work involving energy sources to be controlled through a lock-out/tag-out program
- Work conducted in high hazard occupancies where flammable liquids, combustible liquids, or combustible dusts are handled.

- Worker qualifications: Is the permit Supervisor qualified? Are the workers performing the hot work qualified? Consult training records to verify the qualification of in-house staff that will supervise or perform hot work. Confirm their training is current. For contractors, verify or provide appropriate training before they are permitted to perform hot work.
- Work area risk assessment: The work area risk assessment will be conducted by the Authorizer. As an alternative, the Authorizer may assign the assessment to another qualified person such as the hot work Supervisor; however, the Authorizer remains responsible for the completion of an appropriate assessment. The work area risk assessment should confirm condition such as:
  - Work is not planned for a hot work prohibited area.
  - Automatic sprinklers, where installed, are in service. Hot work permits should not be issued for work in areas where automatic sprinklers are impaired.

Managing fixed fire protection other than sprinklers
Where possible, other types of fixed fire protection systems that are present should be in automatic service as well. Where other fixed fire protection systems rely upon smoke detection for release and the hot work may generate smoke that could activate the smoke detectors:

- Impair the automatic actuation means of the system
- Post a fire watch at the manual release
- Instruct the fire watch to promptly actuate the system in the event of a fire

  - Hot work equipment is functional, secure, and in good repair.

Example items for checking oxyacetylene hot work equipment
- Cylinders are secure
- Hose connections are tight
- Flashback arrestors are provided at each regulator outlet or torch inlet
- Flashback arrestor are serviceable following manufacturer guidelines
- Cylinders, cylinder valves, regulators, pressure gauges, and torch assemblies show no signs of physical damage

  - Suitable conditions are present within 10 m (35 ft) of the work.

Conditions to evaluate within 10 m (35 ft) of the planned hot work
- Flammable liquids have been removed
- Combustible materials have been removed or protected with appropriate flameproof tarpaulins or welding screens
- Floors are swept clean of combustibles
- Above floor surfaces are cleaned of combustible dust, lint or debris
- Floor and wall openings are protected with appropriate flameproof tarpaulins, welding screens, or noncombustible close-fitting covers

  - Suitable conditions are present within any enclosure where hot work will be performed.

Conditions to evaluate for enclosure where hot work is planned

- Permits for conceal space and lock-out/tag-out are issued where appropriate
- Adequate ventilation is provided within the enclosure
- Enclosure is thoroughly cleaned to remove all flammables and combustibles
- Enclosure is cleared of flammable vapors
- Actions to purging and ventilate enclosure are verified with appropriate gas detectors

– Qualified fire watch personnel are provided as a continuous fire watch until the permit is closed.

Conditions to evaluate when posting a fire watch

- Number of personnel needed
- Location of personnel
- First aid equipment needed such as portable fire extinguishers or charged hose lines
- Fire watch duration after work is complete

- Authorization: The authorization to proceed with hot work will be signified by the issuing of a hot work permit signed by the Authorizer.

The signed permit will signal that the Authorizer has approved both the work method and the work area risk assessment. The authorization will display the work location, the work description, the frequency of hot work area inspections by the Supervisor, and the date and times for which the permit is valid.

Expired hot work permits

When a hot work permit expires, hot work is to stop and Parts 4 and 5 of the permit are to be completed. If work is not complete, a new permit is to be issued before hot work resumes. Repeat all risk assessment and authorization steps before issuing a new permit.

Part 2 - Worker acknowledgement

Part 2 begins with the Supervisor conducting a briefing with both the Worker and Fire Watch that includes actions to take should a fire occur and a review of the emergency actions listed on the back of the hot work permit.

The Worker performing the hot work completes Part 2 of the permit by taking the following actions:

- Verifying a briefing on precautions and emergency procedures has been conducted in conjunction with the Fire Watch.
- Sign and date Part 2 of the hot work permit.

A copy of the hot work permit with Parts 1 and 2 completed will be posted in the work area to signify that hot work may begin.

Source: Zurich Services Corporation

Part 3 - Periodic work area inspections

Once work has started, the supervisor will conduct periodic work area inspections in accordance with the frequency stipulated by the Authorizer.

During each inspection, the Supervisor will review the work area risk assessment elements in Part 1 of the permit.

Where no conditions have changed, the Supervisor will complete the first open row under Part 3 with the inspection time, a "Yes" check mark, and initials.

Where an adverse condition has developed, the Supervisor will take the following actions:

- Stop the hot work
- Complete the first open row under Part 3 with the inspection time, a "No" check mark, and initials.
- Provide a description of the non-compliant condition and actions taken.
- Complete Parts 4 and 5 and close the permit.

Part 4 - Final work area inspection
Once hot work is finished (or the hot work activity has been stopped) and the post-work fire watch period has been completed, the Supervisor implements a final work area inspection and complete Part 4 of the posted hot work permit.

Final work area inspections actions
- Visually survey all areas where sparks or heat may have spread
- Verify no signs of fire (e.g. smoke or smoldering) are apparent
- Verify all fire detection equipment impaired during the work are restored to normal service
- Verify all work is complete in accordance with the issued permit

With the final inspection is complete, the Supervisor signs and dates Part 4 of the posted permit and returns the posted copy of the permit to the Authorizer for completion of Part 5.

Part 5 - Permit close out
Once the posted copy of the permit is returned, the authorizer reviews the result of the hot work that was authorized. The Authorizer checks if the work was completed in accordance with the original authorization or if the permit was withdrawn (work not completed). If the permit was withdrawn, record the reason on the permit.

To finalize the closing of the permit, the authorizer signs and dates Part 5 of the permit. The permit is then filed for a period of at least one year.

APPENDIX C – GENERAL RISK ASSESSMENT

The following is a list of sample questions to consider during a general risk assessment:

- What would be the potential consequences of a hot work fire or explosion? For example, consider the possible extent of any damage to property and interruption to business.
- Are there any areas where hot work will be prohibited? For example, areas near combustible/flammable materials including combustible polystyrene composite panels.
- What types of hot work activity might occur, and which can be avoided? For example, how can less hazardous work methods be used to avoid hot work?
- Who would authorize and supervise hot work?
- Who would perform hot work? For example, would work be performed by internal maintenance staff, contractors, or both?
- What standards of competence are required for those authorizing, supervising, and performing hot work? What skills, experience, knowledge, and training will they need?
- What additional training/instruction will be needed for personnel who do not meet the competence standards established above?
- Are adequate procedures in place to assess the competence of contractors selected to perform hot work?

APPENDIX D – PERSONNEL TRAINING

The following provides an outline of minimum training objectives for personnel responsible for hot work operations.

Training – Minimum objectives	
Work Position	**Training**
All personnel	• Understanding the fire risks associated with hot work • Using and applying the hot work permit program
Authorizers	• Understanding regulatory and insurer's requirements • Understanding corporate safety standards • Evaluating work plans and consider alternative methods • Identifying the potential consequences of a hot work fire/explosion • Assessing the risks of fire/explosion occurring, whether they can be reduced to acceptable levels, and if so using what control measures • Preparing a work plan/method statement • Competent to review an assessment/ work plan/method statement prepared by others, e g. a contractor • Preparing or reviewing emergency procedures • Evaluating a hot work area • Selecting the number and location of Fire Watch personnel • Selecting fire watch duration • Selecting work area inspection frequencies • Closing a permit
Supervisors	• Verifying automatic sprinklers are in service • Evaluating hot work equipment condition • Evaluating a hot work area • Evaluating hot work involving enclosed equipment • Selecting the number and location of Fire Watch personnel • Briefing the Worker in precautions and emergency procedures • Conducting periodic hot work area inspections • Conducting final hot work area inspections • Understanding when to prohibit or stop hot work
Workers	• Evaluating hot work equipment condition • Understand the hot work permit program • Understand emergency procedures
Fire Watch	• Use manual fire protection equipment provided during fire watch assignments • Maintain visual awareness across the field of sparks or slag generate by the hot work • Identify potential fire hazards and stop work until corrected • Identify a smoldering or flaming fires • Implement emergency procedures when a fire is detected

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