



Hot Work



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1. INTRODUCTION

This procedure is to be read in conjunction with the Work Permit System.

Hot Work is defined as any work which involves the use of tools, equipment or techniques that could generate heat of sufficient intensity to ignite flammable gases, liquids, dusts or materials.

When performing any Hot Work in Restricted Areas and outside of Restricted Areas where there is a risk of igniting flammable materials or atmospheres, a Hot Work Certificate shall be used.

The following are examples of Hot Work that will require a Hot Work Certificate

- welding,
- thermal and oxygen cutting,
- heating,
- fire-producing and spark-producing operations,
- grinding,
- abrasive blasting,
- concrete chipping and drilling,
- heat treatment or stress relieving of pipe work and equipment,

Remember, Hot Work Certificates are also required for Hot Work outside of Restricted Areas that has the potential to cause a fire (i.e. in grass or scrub areas or areas which contain rubber conveyor belts).

In general workshops will not require a Hot Work Certificate however personnel must ensure that Hot Work within workshops is conducted in designated areas or that all necessary controls are in place to prevent ignition of flammable materials.

1.1 NON INTRINSICALLY SAFE (SPARK POTENTIAL) EQUIPMENT

Non-intrinsically safe (spark potential) equipment is equipment that does not produce a spark or flame outside the equipment casing as part of its normal operation but can produce an ignition source in abnormal circumstances.

The use of non-intrinsically safe (spark potential) equipment may also be considered a risk activity that requires controls to be in place. A Hot Work certificate may be required with continuous gas monitoring within a Restricted Area.

A fire extinguisher and standby person are not required unless specified in the permit to work or hot work certificate.

The following are examples of the use of non-intrinsically safe (spark potential) equipment:

- Use of electrically or battery powered cameras, pagers, mobile phones, or instruments within a Restricted Area, (Equipment that can be proven to be intrinsically safe may be used within Restricted Areas without a Hot Work Certificate),

- Power tools (i.e. drilling),
- The opening of any live electrical enclosure within a defined hazardous zone or Restricted Area,
- Vehicle access into a Restricted Area.
- use of internal combustion engines unless they are specifically manufactured and certified for use in explosive gas atmospheres within a Restricted Area, and

1.2 RESTRICTED AREAS

Restricted Areas are specific operations and areas within CSBP where flammable, oxidising or explosive materials are present (for example, manufacturing, storage and despatch areas). Because of the nature of these materials, a Hot Work Certificate is required for any Hot Work in a Restricted Area. The Certificate shall be obtained prior to the commencement of Hot Work.

Restricted Areas include:

- confined spaces, (as defined in Confined Spaces CSPB-GM-11-031-52),
- proximity of ammonium nitrate, nitric acid and ammonia manufacture, storage and despatch areas,
- sodium cyanide manufacture, storage and despatch areas,
- areas within proximity of pipes and equipment containing explosive gases or flammable liquids, namely hydrogen, ammonia, chlorine, natural gas, LPG, petrol and diesel,

For further details on Restricted Areas where ammonium nitrate is present refer to AN Safety (*CSPB-GM-11-037-01*).

2. RISK ELIMINATION

There is always a requirement to avoid, wherever practicable, the use of ignition sources within Restricted Areas. Because that requirement cannot always be met, there is an ongoing need to utilise Hot Work Certificates and gas testing to fully confirm environments are gas free.

Before initiating Hot Work Certificates and Work Permits to carry out Hot Work tasks, the following questions need to be considered with the intent to eliminate or reduce Hot Work:

- a. Can Hot Work be avoided altogether by selecting non-ignition-type tools?
- b. Can the work be moved out of the Restricted Area?
- c. Is there an increased possibility of fire because of the presence of flammable or combustible material, such as long grass or wooden pallets?
- d. Can the design be altered to avoid or minimise Hot Work?
- e. Can the work site be shielded from potential vapour sources?
- f. Are the risks associated with the Hot Work justified?

Before any Hot Work commences in Restricted Area, a Work Permit and Hot Work Certificate shall be obtained from the Permit Authoriser for the area or equipment that is to be worked on.



HOT WORK IS NOT PERMITTED IN AREAS WHERE AN EXPLOSIVE GAS ATMOSPHERE IS PRESENT CONTINUOUSLY, OR IS EXPECTED TO BE PRESENT FOR LONG PERIODS, OR FOR SHORT PERIODS WHICH OCCUR WITH HIGH FREQUENCY. AS 60079.10 PART 1 - CLASSIFICATION OF AREAS— EXPLOSIVE GAS ATMOSPHERES.

3. FIRE BREAKS

Fire breaks will always be maintained in accordance with the Town of Kwinana's fire break notice and relevant shire requirements.

4. GENERAL PRECAUTIONS

4.1 EXPLOSIVE LIMITS

4.1.1 Lower Explosive Limit

The lower explosive level (LEL) is the lowest concentration of an airborne contaminant in air capable of producing or sustaining combustion when met with a source of ignition. Concentrations below the LEL will not support combustion; these concentrations are considered too fuel "lean".

Note: Whilst the term LEL is widely used throughout industry and by recognised chemical safety organisations it is important that personnel understand that it is usually referring to lower flammability limit (LFL) as LEL does not necessarily mean that an airborne contaminant will explode if ignited (usually due to lack of enclosure, containment or confinement). Some recognised standards may reference LFL in place of LEL. In practicality the terms are synonymous and the rule outlined in 4.2.2 in regard to LEL below must be adhered to. If a recognised standard references an LEL and a LFL for a substance then the lower of the two shall be used.

4.1.2 Upper Explosive Limit

The upper explosive limit (UEL) is the highest concentration of an airborne contaminant in air capable of producing or sustaining combustion when met with a source of ignition. Concentrations above the UEL will not support combustion; these concentrations are considered too fuel "rich".

4.2 GAS TESTING

Gas testing must be conducted in accordance with [Gas Testing](#) (CSBP-GM-11-031-33).

Gas testing results for Hot Work must be within the following limits for work to proceed:

1. Oxygen >19.5% and < 23.5%.
2. Lower Explosive Limit <5.0% LEL.



The gas testing results are to be recorded on the Hot Work Certificate.

4.3 FIRE WATCH PERSON

A Fire Watch Person may be required for Hot Work activities which generate flames, sparks, molten metals or other forms of active ignition sources. This is to be indicated on the Hot Work Certificate.

Note: If a Fire Watch person is required for Hot Work, the Fire Watch person shall always stay within line of sight of the work while the work is in progress and must remain in place for 30 minutes after Hot Work has ceased.

The Fire Watch is responsible for:

- a. Monitoring LEL, Oxygen and toxic gas levels upwind of the hot work where specified by the Hot Work Permit.
- b. Stopping the job where conditions change that increase the risk of fire,
- c. Initiating communication with business unit control rooms and/or permit offices where a fire or significant smoldering occurs using radios or mobile phones where permitted,
- d. Providing the initial response to any fire which may include the use of fire extinguishers or other extinguishing devices as specified by the Hot Work Permit.

4.4 HOT WORK ACTIVITIES ON A TOTAL FIRE BAN DAY

For flame or spark producing hot work, the Department of Fire and Emergency Services (DFES) shall issue a declaration on a day identified as a Total Fire Ban. During this period, any activity in an open area requires additional control measures. An open area is one that is not fully enclosed on all sides and has a door and roof to prevent sparks from escaping. At CSBP only maintenance workshops are considered enclosed work areas on total fire ban days. DFES mandated controls required for hot work in open areas on Total Fire Ban days includes:

- An area of 5 meters radius free from flammable materials immediately around the work site will be established and maintained around all hot work areas.
- Welding screens and wetting down of surrounding area is required to reduce possible spark ignition around the immediate work site.
- The provision of two (2) operational 9 litre dry chemical fire extinguishers at the site of any hot works.
- At least one (1) able-bodied person (trained in extinguisher operation) and wearing appropriate “Personal Protective Clothing (PPC)” is to be in attendance and dedicated solely to the detection and prevention of any fire.
- Two able bodied persons (may include the person completing the Hot Work) are to be in a position to continue to Fire Watch for at least 30 minutes after Hot Work has ceased and complete a check for potential fire activity prior to their departure on Total Fire Ban days.

5. PLANNING, PREPARATION AND ADDITIONAL PRECAUTIONS

5.1 GENERAL

The following additional control measures shall be adhered to as applicable:

- a. Any oxidising materials within ten (10) metres and any flammable or combustible material within 15 metres of the worksite should be removed whenever possible. Oil and chemical spills or deposits must be cleaned and sanded.
- b. Where potentially flammable/combustible sources are within 15 metres (such as wooden scaffolding boards or grass) additional controls must be implemented such as keeping the flammable material wet, using screens or covering with fire resistant material for the duration of the Hot Work.
- c. Drain covers within 15 metres of the Hot Work site should be covered with a fire resistant blanket or other suitable fire resistant material, to form a seal across the whole opening to prevent the escape of flammable vapours from the drainage systems, and the entry of sparks into the drain. Sand should be used to seal the blanket edges.
- d. Any open drain or ditch running within 15 metres of the Hot Work site should be dammed at locations not nearer than 15 metres from the worksite and pumped out.
- e. Any potential sources of flammable vapour or gas, such as sample points, vents, drains, or relief valve outlet situated within 15 meters of the Hot Work site should be rendered safe by isolation. If there is any likelihood of flammable vapour or gas release from an adjacent site, the atmosphere at the Hot Work site should be continuously monitored, for explosive gasses, by a gas, detector which alarms on detection.
- f. The Hot Work Certificate shall show the need for a gas test, continuous gas monitoring, whether a Fire Watch Person is required, specify the tools, equipment and techniques to be used and other precautions.
- g. Before starting Hot Work, the area in the vicinity of the task shall be tested for the presence of flammable gases. Particular attention shall be paid to likely sources of leakage such as flanges and trapped areas such as drains and for presence of flammable gases in hazardous pipelines, which would not normally contain such gases. If any flammable gases are detected, the Hot Work shall be stopped immediately and the Permit Authoriser shall be notified.
- h. Where sparks may be projected from the immediate Hot Work site by the use of grinders, or where work is being carried out at height, suitable precautions should be taken to contain sparks, molten metal and weld spatter.
- i. Mobile plant required to allow the Hot Work to proceed, such as welding generators and air compressors, should be located in a safe area. If they are located within a Restricted Area they should be subject to control using a Hot Work Certificate.

- j. The minimum fire protection equipment requirement is to have a minimum of 1 (one) extinguishers located at the Hot Work site. There may be the need for additional equipment depending on the circumstances.
- k. When work is suspended for a substantial period such as a lunch break or overnight the power source is to be de-energised by:
 - 1. Removing electrodes from holders and place holders where they will not produce accidental arcing.
 - 2. Isolating valves on gas cutting equipment

5.2 HOT WORK WITHIN COMBUSTIBLE PROCESS GAS SYSTEMS

As a general principle, if a system can be practicably worked on through an alternate means without introducing a need for Hot Work then it should (e.g. use of hand tools, hydraulic tools, or pneumatic tools rather than non-intrinsically safe electric tools). However given this is not always possible, the provision to use Hot Work Certificates exists. The Certificates shall be used conservatively only when required and with the necessary additional controls and protocols as outlined within this guide manual.

5.2.1 Protocols required for combustible gas process systems

To minimise risk (and in some cases even reduce the need to utilise Hot Work Certificates altogether) the following protocols must be adhered to whenever de-energising and preparing combustible process gas systems for work.

- a. Depressurisation of the system – The process gas system must be depressurised (to a suitably safe alternative point such as an atmospheric vent, water pot, or flare). Once completed this must be confirmed, logged and initialled within plant log book by the most senior process technician on shift at the time.
- b. Pressure purging of the system – Initial purging may involve sweep purging, however whenever possible the process gas system must be piston purged “up and down” in pressure up to a minimum 300kPa with nitrogen (to a suitably safe alternative vent point, water pot or flare). After piston purging a minimum of three times, the effectiveness of the piston purge task is to be confirmed (using gas testing), and then also specifically noted on the isolation checklist and clearly initialled as a standalone task item which has been faithfully completed.
- c. Gas testing - All confirmatory gas testing to prove purging is to be done at dedicated valved sample points or threaded outlet points i.e. non-bolted joints which have been made available (e.g. by unthreading instruments using hand tools) that are situated well downstream of all expected maintenance activities planned. Where this cannot be achieved the maintenance task will be regarded as more specialised and requiring additional controls (e.g. use of a stand by fire monitor with watchperson and additional shielding for example if needing to tap a line). A TBRA must be conducted for the task which must be approved by the Business Unit Manager or delegate.
- d. Whenever gas testing large or torturous flow designed vessels in particular, greater consideration must be given to pockets of gas that may exist within baffled or high locations within each vessel of concern. Additional caution must be exercised in these circumstances.

- e. Only hand tools, pneumatic or hydraulic tools are permitted in the immediate work area of personnel when breaking into combustible process gas joints for the first time. No electric rattle guns or other electrical equipment / ignition sources are permitted. As a general practice Hot Work Certificates are not to be used to allow this protocol to be relaxed. However in some special instances a deviation from this approach may be required, such as the removal of welded seal plates, and thus in these instances a Hot Work certificate will be required by exception. A TBRA must be conducted for the task which must be approved by the Business Unit Manager or delegate.
- f. For large sized or baffled vessels that contain combustible gases which are **lighter** than air; if they require multiple man way doors (spools, blanks, etc) to be removed, then care should be taken to remove the most lower man way doors in the first instance, followed by the most upper man way door second and then inserting a forced draft ventilation fan at the lower man way door to allow ventilation to commence prior to continuing with the remainder of other unbolting activities (by working from the lower section upwards). This method allows for any remnant combustible gases (lighter than air) that may be present to be displaced from the vessel before allowing Hot Work.
- g. For large sized or baffled vessels that contain combustible gases which are **heavier** than air; if they require multiple man way doors (spools, blanks, etc) to be removed, then care should be taken to remove the most upper man way doors in the first instance, followed by the most lower man way door second and then inserting a forced draft ventilation fan at the upper man way door to allow ventilation to commence prior to continuing with the remainder of other unbolting activities (by working from the upper section downwards). This method allows for any remnant combustible gases (heavier than air) that may be present to be displaced from the vessel before allowing Hot Work.
- h. All process gas joints are to be opened away from maintainers performing the task. Caution to be exercised at all times when breaking into vessels. Gas monitoring is required when breaking joints for the first time (see below).
- i. Continuous gas monitoring must remain in place in the immediate work area until conditions inside the vessel or pipe are proven safe. Where nitrogen has been initially used for purging, gas testing equipment is likely to nuisance alarm on low oxygen content if held too close to the flanges being unbolted, however if alarming is due to >5% LEL additional controls must be implemented.



In low Oxygen environments the LEL sensors will not give reliable readings as they require Oxygen to measure the LEL levels.

- j. Once these first activities of breaking of joints is completed and forced fan ventilation has established the internal environment is free of combustible process gas, then continuous gas monitoring may be relaxed to reflect the considerations of each job on a case by case basis. Similarly, the use of Hot Work Certificates to systematically control Hot Work on a case by case basis is permitted once this point is reached.

In combination with these protocols Breaking into Hazardous Pipelines (CSPB-GM-11-036-02) should always be followed.



**IF THERE IS ANY POSSIBILITY THAT FLAMMABLE OR EXPLOSIVE SUBSTANCES
MAY BE PRESENT HOT WORK IS NOT PERMITTED.**

5.3 HOT WORK WITHIN 10M OF AN / ANE PLANT AND EQUIPMENT

As a general principle, if a system can be practicably worked on through an alternate means without introducing a need for Hot Work then it should (e.g. use of hand tools, hydraulic tools, or pneumatic tools rather than non-intrinsically safe electric tools). However given this is not always possible, the provision to use Hot Work Certificates exists. The Certificates shall be used conservatively only when required and with the necessary additional controls and protocols as outlined within this guide manual.

5.3.1 Protocols required for AN / ANE Plant and Equipment

To minimise risk (and in some cases even reduce the need to utilise Hot Work Certificates altogether) the following protocols must be adhered to whenever de-energising and preparing Ammonium Nitrate and Ammonium Nitrate Emulsion systems for work.

- No direct or indirect heat source to be applied to equipment which may contain AN/ANE (refer to procedure [AmmoniaAN Decontamination Procedure \(CSBP-GM-00-037-07\)](#))
- Follow the procedure [Breaking into Hazardous Pipelines - CSBP-GM-11-036-02](#)
- If conditions cannot be met, a TBRA must be conducted and approved by prod manager before proceeding

6. HOT WORK CERTIFICATES

6.1 HOT WORK CERTIFICATES

- a. A Hot Work Certificate cannot be used as a standalone permit to work. It must always be raised as a supporting Certificate for the Work Permit.
- b. Whenever the evacuation siren sounds all Hot Work Certificates and Work Permits are suspended until the all clear is given. The Work Permit must be revalidated after the all clear is given prior to work recommencing.
- c. Additional work cannot be added to the scope once the Hot Work Certificate has been authorised.

6.2 PREPARATION OF HOT WORK CERTIFICATES

All Hot Work Certificates (CSPB-PF2466) are prepared in triplicate:

- a. Original Copy (white)



Hot Work



Remains with the Permit Holder until the Hot Work Certificate is cancelled by the Permit Authoriser. Gas test results are recorded on this copy.

b. Duplicate Copy (yellow)

Remains in the Work Permit Office with copies of the Work Permit, Isolation Checklist and any other relevant documentation associated with the Work Permit.

c. Triplicate Copy (pink)

Remains in the Hot Work Certificate book or with the Permit Authoriser in the permit issuing area.

6.3 HOT WORK CERTIFICATE

6.3.1 Work Scope

The Hot Work Certificate is prepared by the Permit Authoriser on request from the Permit Holder. The Permit Holder must fully inform the Permit Authoriser of the following:

- a. Plant / Area and/or Equipment number for the Hot Work to take place on.
- b. The equipment description (plant / equipment / pipe work etc).
- c. The scope of work, i.e. details of the task to be undertaken and the tools and equipment to be used in the work task. No work outside the scope detailed on the Hot Work Certificate may be performed.

6.3.2 Precautions

The “precautions to be taken” section of the Hot Work Certificate must reflect the controls stipulated in the Job Safety Analysis. All items must be ticked either YES or NO.

The Initial gas tests must be completed by an Authorised Gas Tester and the results entered onto the Hot Work Certificate. The ongoing gas testing requirements while the work is in progress must be stipulated.

Once satisfactory results have been entered onto the Hot Work Certificate, the Authorised Gas Tester must enter his name, sign and date the form.

All repeat gas tests must be recorded on the reverse side of the Hot Work Certificate by the Authorised Gas tester.

6.3.3 Work Commencement Authorisation

Prior to the authorisation and issue of the Hot Work Certificate, the appropriate Work Permit must be prepared so that authorisation of both documents can take place together and be issued at the same time.

Prior to approval the Permit Authoriser must ensure that all controls are in place and the Permit Holder is briefed. Once this has occurred, approval for the work to commence is given by the Permit Authoriser recording their name, signing and dating the document.



6.3.4 Certificate Acceptance

On receipt of the Permit Authoriser's approval to proceed, the Permit Holder must record their name, signature and date on the Hot Work Certificate. This acceptance acknowledges that the Permit Holder fully understands the hazard controls and precautions in place for the work. The Permit Holder must brief the work team on the hazard controls and precautions associated with the work task.

Any change of Permit Holder must be reflected by the new Permit Holder recording their name and signing the Hot Work Certificate. More than one change will necessitate the raising of a new Hot Work Certificate.

It is the responsibility of the Permit Holder to brief the Fire Watch Person of his duties and responsibilities associated with the particular work task. Once briefed, the Fire Watchperson must sign onto the Hot Work Certificate.

Each copy of the Hot Work Certificate is distributed as per Section 5.2.

6.3.5 Period of Validity

As with all Certificates, the Hot Work Certificate remains valid whilst the associated Work Permit is valid. The Hot Work Certificate does not by itself allow any work to be carried out. The associated Work Permit must be revalidated by the Permit Authoriser each day to allow work to proceed, or by the oncoming shift if the work is to cross over operational shift change.

6.3.6 Work Completion

On completion of the Hot Work for which the certificate has been raised, the Permit Holder should return both the Hot Work Certificate and accompanying Work Permit to the Permit Authoriser. The Permit Authoriser should collate all three copies of the Hot Work Certificate and have the Permit Holder sign off all copies. The Permit Authoriser, if satisfied, will then cancel the Hot Work Certificate by signing off the certificate.

6.4 ORIGINAL COPY OF HOT WORK CERTIFICATE LOST

In the event that the original copy of the Hot Work Certificate is lost or damaged beyond recognition, the pink copy can be photocopied.

6.5 SUSPENSION OF HOT WORK CERTIFICATE

All Work Permits and Hot Work Certificates are suspended on the sounding of the evacuation siren. Once the all clear has been declared, all Work Permits must be revalidated before returning to work.

Hot Work Certificates shall be suspended if any of the following occur:

- a. A person stops the work because of circumstances they deem is unsafe.
- b. Should operating conditions surrounding the work task change.



Hot Work



7. REFERENCE MATERIAL

7.1 REGULATIONS AND CODES

Occupational Safety and Health Regulations 1996.

7.2 AUSTRALIAN STANDARDS

AS 60079.10 Part 1 - Classification of areas— Explosive gas atmospheres

AS 1674.1 Safety in welding and allied processes.

7.3 RECORD KEEPING TABLE

RECORD IDENTIFICATION		STORAGE	STORAGE	INDEXING	RETENTION	AUTHORISED	DISPOSAL
Form No.	Document Title	MEDIA	LOCATION	METHOD	PERIOD	DISPOSER	METHOD
CSPB-PF2466	Hot Work Certificate	Paper	Authorising Officer	Date	12 month	Authorising Officer	Bin