

Making sense of risk
Risk engineering
Asia Pacific



Marine hot work Permit to Work (PTW) systems



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Hot work is any operation involving open flames or producing heat and/or sparks, including but not limited to welding, oxygen and arc cutting, open flame soldering, brazing, hot riveting, grinding and pipe thawing.

Hot work operations should be strictly supervised and controlled to minimise losses from fire or explosion. Anecdotal evidence suggests that human factors, including failure to properly follow procedures, are a significant cause of breach-of-safety incidents. These failures may be attributable to insufficient training, poor communication or a lack of understanding of either the purpose or application of a [Permit to Work \(PTW\)](#) system.

This guide is intended specifically for shipyard management and safety management teams. It provides them with practical guidance in implementing an effective shipyard hot work PTW system that aims to reduce the risk of injury to personnel and of damage to vessels under construction.

All hot work losses are preventable!

What is a PTW system and when is one needed?

A PTW system is a formal, documented process used to control certain types of work that are deemed hazardous. A PTW system is more than simply permission to carry out a hazardous job. It is a step-by-step process outlining how a job can be conducted safely.

A PTW system should be implemented whenever the intended work has the potential to affect the safety of work personnel, cause damage to the vessel under construction, or impact the surrounding environment.

While PTW systems are appropriate for a wide range of activities, this guide focuses on the implementation of a hot work PTW system for welding, gas cutting and grinding and other shipyard activities that may produce flame, sparks or heat.

Hot work PTW essentials

The hot work PTW is essentially an agreement between the [Permit Approver/Issuer](#) (often the construction manager) and the [Permit Applicant/User](#) (often the section foreman). This agreement documents the site conditions, the

precautions required in advance, and any limitations envisaged for a specific hot work project. Crucially, the hot work PTW must be drawn up and implemented before hot work commences.

As a minimum, the hot work PTW should include:

- a brief description of the hot work
 - the specific location where the hot work will occur
 - the hazards involved (for example, flammable materials, combustible surroundings)
 - any conflict with other activities
 - the envisaged duration of the work
 - the duration of the permit's validity
 - a list of the precautions which must be taken before work begins (for example, isolation, ventilation, atmosphere monitoring)
 - a list of the precautions which must be taken during and after completion of the work (for example, setting a [Fire Watch](#))
 - the date of issue of the PTW and the name/signature of the [Permit Issuer](#)
 - the date when the PTW is received and the name/signature of the [Permit User](#)
 - the date and time of hot work completion and permit return
 - sign-offs from relevant personnel and contractors.
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Hot work PTW management

A hot work PTW usually involves four copies, one each for the:

- [Permit Applicant](#), that is, the person(s) directly involved in the task
- [Permit Authoriser](#)
- [Permit Approver](#)
- [Shipyard Safety Management](#) or shipyard control centre.

The [Permit Applicant](#)'s copy is posted at the work site to show that a PTW has been issued. It is returned to the [Permit Approver](#) when the work is completed.

A hot work PTW should be issued only by an authorised person who is familiar with the work to be done and the work site and who has received appropriate training. The [Permit Approver](#) or a [Safety Officer](#) should inspect the place where the work will be performed to verify its suitability prior to issuing the permit.

It is essential that a competent person (for example, the [Shipyard Safety Manager](#)) is appointed to coordinate and control the issue and return of the PTW. This ensures that they have oversight of all operations; that is, those under way as well as those planned for the future. This oversight is crucial if they are to take responsibility for managing the hazards associated with simultaneous activities.

Key issues

Certain key points are important in the implementation of a hot work PTW and must be vigilantly monitored and implemented. Crucially, the hot work PTW is activity- and time-specific: it is valid only for the work specified on the permit and only until the deadline stated

on the permit. Good practice indicates that permit validity should be no longer than the work shift.

Prior to hot work commencing

- the [Permit Applicant](#) and other workers involved in the work must have attended a hot work training course
- all workers involved in the job should have read and understood the scope and conditions of the hot work PTW
- the risk assessment or job safety analysis (JSA) for the activity should have been completed, communicated to all involved in the activity and, where applicable, posted at the work place
- the [Permit Approver](#) or a [Safety Officer](#) should have inspected the place where the work will be performed to verify its suitability prior to issuing the permit
- the site foreman involved in the job should have been given a copy of the permit and should be made aware that other workers, operations or materials in the adjacent areas may be affected by the hot work operations
- emergency precautions should have been taken and emergency equipment should be on standby at the job site (for example, fire extinguisher, [Fire Watch](#), atmospheric monitoring)
- all personnel should be wearing the correct Personal Protective Equipment (PPE) at all times.

During hot works

- any change in the working conditions invalidates the PTW and hot work should stop immediately
- where hot work is being done in an enclosed space, atmospheric monitoring should be conducted at regular intervals and ventilation should be operating at all times.

On completion of the hot work

- the [Permit Applicant](#) should return the hot work PTW to the [Permit Approver](#) for sign off and verification that the hot work is complete, and that the work site has been restored and is safe.

Developing a hot work PTW system for shipyards

Rigorous and effective hot work PTW systems share some common elements.

Executive oversight The implementation of a hot work PTW system in a shipyard must be driven by a senior manager with a clearly defined responsibility to put in place and oversee an appropriate PTW system.

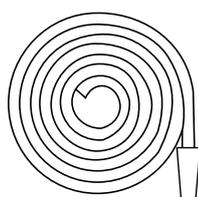
Procedure development The designated senior manager should introduce appropriate procedures that are the basis for all work done under the PTW system. It should be understood that a permit cannot be authorised by the person who is applying to do the work. There should be clear identification of personnel appointed to be [Permit Authorisers](#) and [Permit Approvers](#).

Communication and training A detailed communication and training plan should be developed to ensure that all involved shipyard workers – employees and contractors – are aware of and understand the PTW system. Where appropriate, they should be trained in its operation.

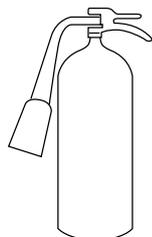
Monitoring and measurement The hot work PTW system should be monitored to ensure that it is correctly applied and that it is effective. A measurement process should be designed so that the PTW system can be regularly audited

Examples of diagrams to aid completion of a PTW

FIRE PRECAUTIONS AT WORKSITE



Live fire hose

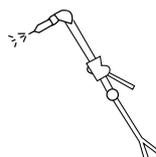


Fire extinguisher

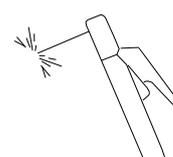


Firewatch –
standby/monitor

ACTIVITIES PERMITTED UNLESS CROSSED



Cutting/heating



Welding/gouging



Grinding

and reviewed to ensure standards are maintained and that the system remains relevant under changing operational conditions.

Documentation To facilitate measurement, monitoring, PTW system review and incident investigation, copies of all permits issued must be kept for the specified period.

Resourcing An effective hot work PTW system requires the allocation of adequate resources. This involves budgeting for the costs of the management time, work hours and training involved in implementing and managing the system.

Hot work PTW training

To enhance the consistency and quality of their operation, hot work PTW systems must be practical rather than bureaucratic; simple rather than complex.

Many effective hot work PTW systems use a single form with tick boxes and bullet points; however, effective training is crucial to achieve effective, reliable and consistent use of even the simplest PTW system. The diagram above illustrates how even basic visuals can aid the proper completion of a hot work PTW.

All employees and contractors working in the shipyard should receive training in the site-specific hot work PTW to ensure their understanding of the system.

Permit Authorisers and **Permit Approvers** should receive specialised training that covers:

- the principles of a hot work PTW system
- when a hot work PTW is required
- How to evaluate the risks at the intended work area, its boundaries and adjacencies
- an overview of different types of PTWs, supporting certificates and

related documentation (for example, risk assessments and JSAs)

- the responsibilities and competence requirements for **Permit Authorisers** and **Permit Approvers**
- the responsibilities of **Permit Applicants**
- lessons learned from previous hot work PTW-related incidents and findings from audits and reviews.

The **Fire Watch** personnel responsible for monitoring the hot work site for fire should also receive training that includes:

- fire classes
- fire prevention
- fire-fighting practices, including the appropriate means used to extinguish fires of different types and origin
- types of fire-fighting equipment
- fire alarms
- communication during a fire
- safe escape routes for all workers and visitors to site.

Monitoring the hot work PTW system

All work safety systems can degrade over time as a result of complacency or over-familiarity. It is important that compliance to the hot work PTW system is monitored, enforced and regularly reviewed.

As a general rule, the construction manager, [Safety Officers](#) and site foremen should conduct daily safety monitoring on the vessel under construction. The following points relating to hot work PTW systems should be verified during these regular safety walkabouts:

- Are permits properly displayed?
- Are they valid?
- Was the permit properly completed?
- Is the specified safety equipment in place?
- Have the specified precautions been taken?
- Has the working party been briefed?
- Does the working party understand the conditions of the permit and has it implemented the permit's requirements?

More in-depth regular inspections and annual audits should be scheduled as part of the regular shipyard safety reviews.

Want more information?

Guidance on permit-to-work systems – A guide for the petroleum, chemical and allied industries –

HSE UK ISBN 978 0 7176 2943 5.

Guidelines on permit to work (PTW) systems –

Report No 6.29/189 – January 1993.

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