WORK PERMIT SYSTEM

National Safety Council, Hqs.
98-A, Institutional Area, Sector 15,
CBD Belapur, Maharashtra
NaviMumbai – 400615.
India www.nsc.org.in
Contact no: 022-27579924/25
WORK PERMIT SYSTEM

What is a Work Permit?
A permit to work (PTW) system is a document which sets out the work to be done, precautions to be taken for all foreseeable hazards involved & records the state of equipment when handed over while it does not itself make the job safe. It makes the work method fool-proof. Examples of jobs needing work permits are those requiring employees to enter and work in confined spaces, to repair, maintain or inspect electrical installations or to use large or complex equipment.

Why use a Work Permit?
When a job has the potential of causing serious injuries or death, it is necessary to formalise agreed upon work procedures. This prevents instructions from being missed, forgotten or misinterpreted. It also serves as a checklist to ensure that all hazards have been identified and evaluated. Work permit is issued for non-routine work and not for routine work like cleaning, housekeeping etc.

In addition, the occupier or supervisor and the assigned worker(s) will be able to verify that all requirements and conditions are complied with and before the job is started.

When is a Work Permit Needed?
Work permit should be used when there is danger from:
- fire;
- sparks from open flames, welding, cutting, furnaces, etc.;
- explosive, corrosive or toxic gases or atmospheres;
- pressure systems;
- steam or other hot materials (burns);
- electricity and other energy sources;
- accidental start-up of mechanical equipment;
- oxygen deficiency or oxygen enrichment;
- suffocation or drowning (for example, in bulk material bins or solvent storage tanks);
- restricted access, exit and movement;
- toxic substances; radioactive materials;
- lasers;
- temperature extremes;
- any other recognised serious safety or health hazard.

Applicable Statutes/Salient Features/Provisions of the Statutes
The Factories Act, 1948 & Model Rules made there under

- Though there is no express provision under the Factories Act concerning work permit, the precautions laid down under the provisions of Section 36 – Precautions against dangerous fumes, gases etc. Section 36-A Precautions regarding the use of portable electric light and Section 37-Explosive or inflammable dust, gas etc. for work in any confined space, wherein gas, fume vapour or dust is likely to be present.
involving risk to persons, use of portable electric light or appliance for such work in confined space and for work in any manufacturing process producing dust, gas, fume or vapour of such character likely to explode on ignition, respectively. These precautions can best be observed by following a work permit procedure and State Governments notified Rules.

- For example, Maharashtra has framed the specific Rule 73-C on Safety Measures in Factories where equipment or pipeline containing inflammable materials are operated, deal with the issue of work permit as safety measure. The precautions laid down under Section 36, Section 36-A and Section 37 are thus specifically covered by this Rule requiring the adoption of work permit procedure.

Further, Rule – 73 F for the Maharashtra Factories Rules on Fragile Roofs – Provision of crawling Boards etc. lays down the issue of work permit each time when a worker is required to work on the fragile roof.

**The Petroleum Rules, 1976 (framed under the Petroleum Act, 1934)**
Rule 98 (i) & (ii) on Repair and Maintenance of pipe line require inspection of pipeline section which is to be repaired and issuance of written permit specifying therein the precaution to be observed and the procedure to be followed. The permit shall be preserved by the owner of the pipeline for a period of 6 months.

Rule 172. Permit to carry out maintenance work. It applies to refineries and prohibits any maintenance and repair work or entry in a confined space except under and in accordance with the conditions of a written work permit issued by a Competent Person authorized by the Occupier.

**Indian Electricity Rules (framed under the Indian Electricity Act, 2003)**
Rule 36(2) handling of Electric Supply lines & apparatus requires authorisation to be obtained before working on any line or apparatus.

**Work Permit Requirement**

**Permit is required for the following jobs**
- Major & Minor Maintenance work.
- Inspection.
- Construction.
- Alteration.
- Process Equip. cleaning
- Entry into confined space.
- Excavation
- Vehicle entry into hazardous areas etc.

Depending on the job, any one of the following types of permits may be used:

**Types of permits**
- Work Permit for Hot & Cold Jobs
- Vessel Entry Permit
• Excavation Permit
• Work at Height above 2 metres
• Electrical Work Permit on Electric Distribution System

**Hot work permits**
Issued for work using or generating heat that is sufficient to ignite gases, vapours, dusts, etc. Some examples are welding, flame cutting, and metal drilling, soldering, sand blasting, grinding.

- A hot work permit can be given by a Competent/Authorised person.
- It will be given only after satisfying the conditions of a valid safety work permit for particular work. Red colour form will be used for preparing the fire permit.
- Authorised person for hot work permit will sign at the place marked authorised person in the permit.
- All persons concerned should clearly understand that the hot work permit does not in any way relieve any one of responsibility for taking all necessary precautions to eliminate the possibility of fire or explosion before, during and after hot work is performed.

If a hot work permit is needed for any job in the factory area other than plant/equipment, such as fabrication, asphalt/lead melting, the site will be inspected and okayed by fire department to satisfy that the fire precautions are adequate for the job. He will sign the permit at the place marked authorised person. The permit will then be signed for flame clearance by a Senior Officer. The validity of permit will be clearly indicated.

**Guidelines for Hot Work**
- 9 meters radius around the area in which any hot work is to be carried out should be cleared off all flammable material, asbestos curtains or sheet metal may be used for screening.
- Drains, trenches to be properly cleared and covered.
- The surest way to prevent fires from hot work is to conduct such operations at a fire-safe work site. If the work must be done on location, the area should be thoroughly cleared, protected against fire.
- Consideration should be given for the wind direction which can carry flammable vapours into hot work zone, sparks into material, drains, etc.
- When welding and cutting operations are carried out above floor level, especially in plant and storage tank area, an asbestos blanket should be hung as near as possible so that sparks are not carried away.
- Ground below to be cordoned off.
- Welding cables should not have loose connections and earthing must be firm to prevent sparking.
- The object to be welded should always be directly earthed with the machine. The return cable should be connected very near to the job.
- Oxygen, acetylene cylinders should be taken inside tanks or closed vessels.
- Where vessel entry is required the oxygen content of the air shall not be below 20% by volume.
• During welding/cutting care should be taken to ensure that oxygen content is not reduced below 20% by volume in vessel.
• Use initially long handled flamed from outside the tank.
• Before applying flame on any leaky lined equipment, at least 6" area around the leaky portion must be cold-cut to ensure that product is not entrapped between the lining and vessel wall. This may be necessary when the vessel had contained chemicals which are normally removed by water wash.
• For drilling operation hot work permit is required.

Work at height
Work at height means to work at 2m above the ground level. For work at height; permit to work is essential. While giving work permit for people working on monkey ladder, the most essential thing required from safety point of view while climbing ladder, use fall arrestor system.

Safety work permits
Issued when work involves steam, water, air or electricity. Safety permits are also needed when repair or maintenance work requires locking out energy sources. During giving work permit system for lifting operation check Safe working load of lifting machine, check the peripheral radius of lifting machine, check for use of PPE

Vessel Entry permits
Used when workers are required to enter and work in confined spaces such as silos, tanks, or pits. These permits are often combined with the other permits described here, depending upon the nature of the work to be carried out in the confined space.

Tank Preparation for Entering Vessels :
• The contents of the tank should be pumped out as completely as possible through the regular pump out lines. If necessary water may be added to raise the liquid level to the pump suction to remove the flammable content completely.
• “Sparks from welding and cutting operations are actually globules of molten metal with temperatures frequently in excess of 1,650°C. The area should, therefore, be protected to the full distance which sparks may fly – latterly 9 metres or more from the point where welding or cutting is being done.
• A qualified trained employee using instruments designed for the purpose should test the atmosphere for hazardous concentrations of gas or vapour before work starts and periodically as the work progresses or conditions change.
• Where an atmosphere is or may be flammable/toxic/deficient in oxygen, issuance of a permit must be postponed and all sources of contaminant must be kept out of the area until tests show that the concentration of gas or vapour is safe.
• The atmosphere of closed containers and confined spaces may be deficient in oxygen, toxic or explosive. The vessel after preparation should be tested of ensure
that the flammable contaminant has been reduced to 10% of the lower explosive limit (as a pre-requisite for issuance of a hot work permit) and the toxic contaminants below its threshold limit value and the oxygen level at 19.5% minimum in the general atmosphere (before entry without respiratory equipment). This safe atmosphere should be maintained by continued ventilation during the entire time that work is in progress.

- Otherwise, no attempt to merely enter the vessel should be made, unless the individual is wearing respiratory and other protective appliances approved for the exposure.

- Excavation work permit is given when the depth of the trench is 2 m and below

**Unique permits**
Issued when work involves hazardous conditions such as working near radioactive materials, working on heights when the work is to be carried out on a height more that two metres, or carrying out other specialized work.

**General permits**
Issued for highly hazardous jobs of a more general nature, those are not covered by any of the permits described above.

Work permit system assures Safe working environment, Use of proper PPE, Compliance of all things which is needed while working, Locking off the Power .

**Excavation Permit**
In plant sites with numerous underground systems such as pipelines, power conducts, where soil conditions are unstable or possibly contaminated, digging or excavation operations are frequently controlled by a permit system. An "Excavation Permit" is to be used to ensure that any of the following desirable measures have been or will be taken.

- The drawings of the area have been checked for existing lines and the plant/electrical/ civil engineer agrees to the operation.
- The soil has been checked for contamination by flammable or toxic materials.
- The area is properly posted and barricaded or roped off.
- Fire department informed.
- Proper shoring materials and methods are going to be used if the excavation exceeds to certain minimum depth, usually 5 feet.
- Excavation can be authorized by a competent person.
- Instructions for feedback are issued and ensured.

**Access to Fragile Roof Permit**
The asbestos cement roof sheets whether they are of corrugated or Trafford variety are fragile and cannot withstand direct impact. The manufacturers have also never claimed that this is so. In a chemical process plant there is the additional possibility of the roof getting affected due to fumes.
It is statutory that a permit to work on the fragile roof is issued to an individual each time he is required to work thereon. The permit stipulates use of crawl or duckboards or use of collapsible extension ladders made of light aluminium alloy of pine wood to walk on the roof sheets, so as to distribute the load over the safe means of access to be followed for ridges and purlins. The permit should also include reaching the roof. This permit can be issued by a competent person. The work should be approved by the shift/area supervisor where work is to be done before start. This is to ensure that the Supervisor and his persons in the vicinity are aware of the work being carried out by an outside agency. This will also enable to caution the persons working in case of an emergency in the plant area. The permit should include date, time, mode of work to be carried out by the persons, number of workers engaged, places of work, name of contractors etc.

**Electrical Work Permit :**

Working with electricity can be dangerous. Engineers, electricians, and other professionals work with electricity directly, including working on overhead lines, cable harnesses, and circuit assemblies. Others, such as office workers and sales people, work with electricity indirectly and may also be exposed to electrical hazards. Workers in the electric power industry are potentially exposed to a variety of serious hazards, such as arc flashes (which include arc flash burn and blast hazards), electric shock, falls, and thermal burn hazards that can cause injury and death. For all “Electrical isolation and energisation of equipment / line-HT” or “Electrical isolation and energisation of equipment / line-LT” permit shall be taken, depending on the case. Similarly “Permit to work on HT line and Equipment” or “Permit to work on LT line and Equipment” shall be taken by user Department., depending on the case. Clearance certificate shall also be taken as the case may be. Electrical equipment should be properly isolated and grounded. However in a manned Grid Substation, this activity will be carried out by the concerned grid operation staff & the Permit Holder in this case has to confirm the same before starting the job.

Permits for work shall be applied by an authorized person to take line clear and shall be issued by the Engineer (or competent person in charge of operation) in writing in the form prescribed. No line or equipment should be made again live until the permit issued on it, is returned.

A ‘separate PTW format’ shall be used for the jobs of long duration especially, more than 3 days that fall under the category of electrical work. Additionally, the Permit Holder has to ensure that necessary precautions should be taken so that the concerned equipment is not energized by any normal switching operation. The same person who takes the permit should return the permit.

**Work Permit for Contractors**
- In case outside agencies, the department contracting the job should prepare a written clearance/using detailing the jobs to be done, and get it authorised from the
process department before allowing the contractors to commence work in the process/storage area.

- The number of persons the Contractor will be engaging for the job should be clearly indicated in the permit.

- It is the responsibility of the company’s contracting department to maintain liaison with the contractor in all matters relating to safe working.

Permit will clearly indicate the work duration and the location

**How is a Work Permit System Set Up?**

**Establish the written or laid down Policy and Procedures**

The policy should:
- emphasise the importance of a work permit (it’s easier to implement a policy when employees understand why it’s needed);
- specify when a work permit is needed;
- establish a chain of command and define the responsibilities of each party, identify staff who are authorised to issue/ revoke permits.

**Develop procedures to put the policy into effect.**

The procedures should:
- Clearly identify the types of jobs requiring work permits.
- Explain how the permit system works. For example:
  - when to apply for a permit (how many hours before the work is started?);
  - where to get a permit;
  - how to fill it out
  - how many copies are needed;
  - who gets a copy;
  - who must be informed of the work;
  - what to do with the permit when work is stopped or completed.

- **Define responsibilities.**
  For example:
  - who fills out the form;
  - who identifies hazards;
  - who ensures precautions have been taken;
  - who is authorised to issue/revoke permits;
  - who supervises the work;
  - who ensures work is completed.

A thorough deliberation is needed by the safety committee representatives while developing the policy and procedures. Upon finalizing the policy and procedures, it should be signed and dated. Also, it should be ensured that the policy and procedures are communicated to all staff.

Three minimum copies are required of work permit during setup out of which one copy of the work permit system should go to Safety department.
Information required to be incorporated in the Work Permit

- name(s) of worker(s);
- exact work location;
- work to be done;
- date and time the work is to start and end;
- identified hazards;
- preparatory requirements, such as testing, equipment and machinery to be shut down/locked-out, ventilation, etc.);
- correct sequence of procedures;
- personal protective equipment required;
- emergency equipment needed;
- a telephone number to call for help, and where the nearest phone is located;
- signature of authorised person(s);
- signature of worker(s) to indicate that they understand the hazards involved and know the precautions;
- date and time the permit is issued.

Training
No matter how well designed the work permit system is, it will only succeed if the staff are aware that it exists and understand how to comply with it.

- Provide training, preferably as a group, to all possible users and staff involved in the permit system. Explain how the work permit system can help prevent accidents, injuries and death.

- Outline the duties and responsibilities of each party. Emphasise that the teamwork is critical. The person filling out the form, the person preparing the work area, and the person doing the job must each carry out their responsibilities thoroughly for the system to work. Since the work permit is designed to protect the employees against hazards that can cause critical injuries or death, all participants should be trained to identify hazards.

- Provide supervisors with special training necessary for them to determine that working conditions are safe at all times.

The workers to be informed to report any hazards and they should know the early warning signs and symptoms of the presence of a hazard. For example, an odour similar to rotten eggs may indicate exposure to hydrogen sulfide. Workers must also be instructed to stop work and evacuate the area immediately if:

- ordered by an authorised person;
- a fire or evacuation alarm sounds;
- they believe they are in danger.

The workers should be made to understand that ignoring safety and health precautions endangers not only themselves, but also the rescue team. There have been several cases where rescuers have been injured or killed.
The rescuers should be trained for how to use safety equipment properly, and how to perform emergency entrance and exit procedures. Conduct drills to test their proficiency on rescue procedures and first aid.

Provide training before new technology or processes are used. This should be followed by periodic refresher courses to cover experiences with the permit system suggestions for improvement, and staff changes.

**Ensuring a Successful Work Permit System**
A weak work permit system offers little or no protection and may lead to serious consequences.

The underlying guidelines for an effective work permit system:
- Ensure that the work permit system is clear to all staff by providing training on the system.
- Don't allow work to start without a permit.
- Issue permits in a timely manner; not too long before the job. Conditions in the work area can change easily within days.
- Design the permit to be job-specific as far as possible so that it is appropriate to the work.
- Ensure that each work permit is clearly written. Poor communication can cause mistakes and accidents.
- Verify that all requirements and conditions are complied with before signing the permit. The signer for the permit must have appropriate qualifications. Other signers should include the supervisor of the workers assigned to the job, and the supervisor of the work area, and the workers assigned to the job.
- Before workers sign the permit, make sure that they understand the hazards involved and know the precautions to take. Inform them that the work permit takes priority over any other instructions.
- Also ensure that workers know when the permit expires, and comply with it. This requires supervision as workers may tend to continue working until the job is completed.
- Distribute several copies of the permit to appropriate personnel. For example, provide one copy for the worksite, one for the authorised signer, and one for the supervisor of the work area.
- Ensure that emergency personnel (Fire, First aid, Rescue, etc.) are advised of the work and its exact location. Devise emergency plans for the job and have rescue equipment ready in the event of an accident.
- Post signs and use barriers in the work area to prevent entry of unauthorised persons, pedestrians and vehicles.
- Implement field checks to ensure that every detail of the permit is being followed. If conditions at the work site change, notify the designated supervisor and stop all work. Cancel the permit and reissue another only when additional safeguards are implemented.
- When the work is completed or the time limit expires, forward the worksite copy to the supervisor of the workers assigned to the job. The permit should indicate the status of the job. The supervisor must verify that any post-completion requirements are complied with before cancelling the permit.
• If the work is subcontracted, make sure the contractor is aware of the hazards. Ensure that the contractor understands and complies with the job safety requirements and emergency procedures. No relaxation on permit policy and procedures with contractors be allowed as they are less familiar with the facilities and therefore need greater protection.
• Don't overuse the work permit system. Issue a permit only when necessary to avoid having it regarded as nothing more than administrative paperwork.

Control on Work Permit
It is important to monitor and maintain the work permit system to ensure that it is being followed correctly and that it is effective.

Include work permit procedures as part of the workplace inspections. Review the work permit system at least every six months. Also consult the staff on the effectiveness of the system and consider their suggestions to improve it.

Other control measures may include;
• in-plant spot checks that work permits are being used, and complied with properly;
• questions or tests to establish a person's competence to qualify as authorised signer;
• review of written procedures and the permit form used;
• a detailed investigation of all incidents under work permit conditions.
• everyday validity of work permit system should be checked.
• It is essential to close the work permit after work

Benefits of Work Permit System
Work Permit provides written information on the prevalent hazards connected with the job performance. It spells out suitable precautions to be taken & remedial measures to be adopted to encounter the hazardous conditions that can be encountered while performing the job. It indicates the various types of personal protective equipment to be used at different stages of work.
• It serves as predetermined checklist for various safety precautions to be taken.
• It provides a written record of the operation including the personal who were involved in authorizing and carrying out the operations.
• The permit system which necessitates carrying out of various tests and safe guards instill a sense of security from accidents in the minds of crew performing the job.
• The work permit system proved to be one of the most satisfactory methods of ensuring positive control over hazardous operation performed in unfavorable conditions

Summary
The work permit system offers one of the best methods to meet various conditions required for making a hazardous operation safe and easy to perform and Safety precautions to be taken during the work.

* * *
Sample Work Permit

This sample permit is a guideline only. It may be modified to make it appropriate to the work to be done and to suit the job requirements.

Valid only for work described on the permit

<table>
<thead>
<tr>
<th>Pre-work requirements</th>
<th>Done (initials)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Equipment locked out?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Atmospheric conditions tested for safety?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Stand-by guard posted?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Emergency rescue procedures reviewed?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work requirements</th>
<th>Done (initials)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Area barricaded, roped off, signs posted?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Personal protective equipment adequate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Emergency crew advised?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- First aid readily available?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-work requirements</th>
<th>Done (initials)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Tools and equipment removed from work area?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where atmospheric tests are required, indicate results of test:

<table>
<thead>
<tr>
<th>Oxygen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flammability</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Toxicity</th>
<th>PPM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Signature of tester | Date | Time |

All requirements must be complied with before issuing this permit. Permit issuer or designated representative is responsible for checking conditions while work is in progress.

Permit approved by

<table>
<thead>
<tr>
<th>Signature</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
</table>

Worker

I have read the permit and understand the nature and extent of the work. I agree to comply with all safety precautions.

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Completion</th>
<th>Yes</th>
<th>No</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work completed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All safeguards returned to normal?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirements after work complied with?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man and Materials removed from place of work</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Verified by Supervisor

Signature | Date | Time |

National Safety Council, India
COPY - to be kept at worksite and returned to issuing person when job is completed or when permit expires.

* * *

GREEN TRIANGLE FOR SAFETY