

WELDING



A ccording to “Kamus Besar Bahasa Indonesia KBBI 1994”, welding is the process of grafting metal material by heating it.

Or welding can generally mean the process of connecting two or more metal parts by using heat energy, in other words welding is part of the hot work in relation to risk management, due to the use of heat energy, it is ensured that welding may present a fire hazard with respect to a fire triangle where heat energy reacts with air and combustible materials present at the welding site. Therefore, effective measures are needed to prevent the occurrence of fire which may then cause a fire during this welding process.

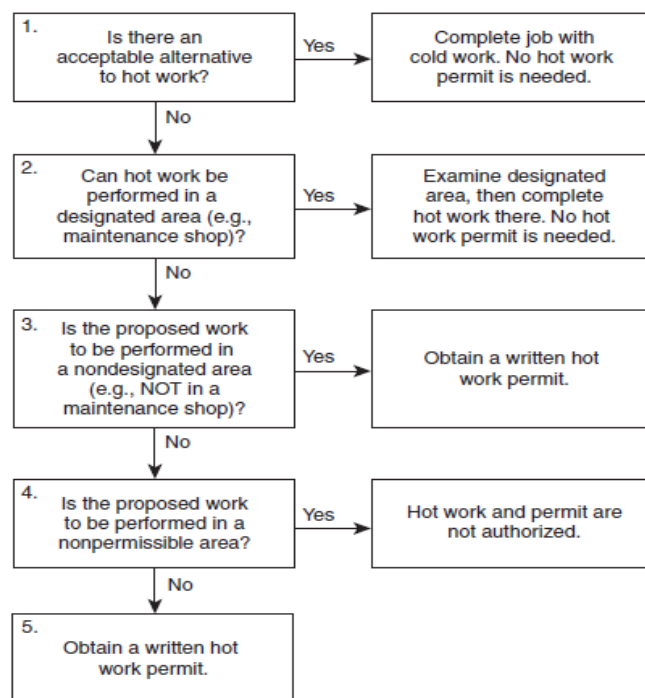
To minimize the risk of fire due to welding, there are procedures that need to be done before the welding, during welding, and after welding. This procedure is part of Hot Work Management (FMDS 10-3 and NFPA 51B) to issue Hot Work Permit (especially in the industrial environment) as a tool for welding work.

The hot work permit in case of welding process is required as shown at Figure 1. While the hot work permit itself in general format can be seen at Figure 2.

Where in the provisions contained therein set the fire prevention measures both before, during and after the implementation of hot work, in general are as follows:

1. Ensure the availability and functioning of fire protection facilities, such as portable fire extinguishers, hydrant systems and sprinklers.
2. Welding equipment (hot work) in good working condition and adequate in accordance with the manufacturing specifications (example: availability flashback arrestor for welding with oxy-acetylene). Hot work personnel are equipped with adequate self-protection equipment.
3. Special permits are obtained for hot work on metal vessels or pipes with layers of rubber or plastic materials.
4. Minimum within a radius of distance of 11 m from hot work, all combustible materials must be removed, the floor must be clean where the combustible floor should be dampened, covered by

Figure 1. Flowchart of Hot Work Permit



wet sand, or welding blanket of the like. At wet floor, personnel welding with an electric welding equipment should be protected from possible shock. If hot work is done close to walls, partitions, ceilings or roofs with a combustible construction, they must be protected by welding blankets or the like.

5. All combustible materials shall be moved within a minimum radius of 11 m in all directions, whereas if this is not possible the combustible material must be sealed with welding blanket or the like. To prevent the entry of sparks, the welding blanket on the floor should be tight, including the position where the cover is stacked to cover a large stock of protected stockpiles.
6. Openings or cracks in floors, walls, or ducting within a minimum radius of 11 m shall be covered with noncombustible or similar material to prevent the welding sparks into other areas.
7. A ducting system or conveyor which may carry welding sparks to other combustible materials shall be protected, turned off, or both.

Figure 2. Hot Work Permit

<h1>HOT WORK PERMIT</h1>	
Seek an alternative/safer method if possible!	
Before initiating hot work, ensure precautions are in place as required by NFPA 51B and ANSI Z49.1. Make sure an appropriate fire extinguisher is readily available.	
This Hot Work Permit is required for any operation involving open flame or producing heat and/or sparks. This work includes, but is not limited to, welding, brazing, cutting, grinding, soldering, thawing pipe, torch-applied roofing, or chemical welding.	
Date _____	Hot work by <input type="checkbox"/> employee <input type="checkbox"/> contractor
Location/Building and floor _____	Name (print) and signature of person doing hot work _____
Work to be done _____	I verify that the above location has been examined, the precautions marked on the checklist below have been taken, and permission is granted for this work. Name (print) and signature of permit-authorizing individual (PAI) _____
Time started _____ Time completed _____	
THIS PERMIT IS GOOD FOR ONE DAY ONLY	
<input type="checkbox"/> Available sprinklers, hose streams, and extinguishers are in service and operable.	
<input type="checkbox"/> Hot work equipment is in good working condition in accordance with manufacturer's specifications.	
<input type="checkbox"/> Special permission obtained to conduct hot work on metal vessels or piping lined with rubber or plastic.	
Requirements within 35 ft (11 m) of hot work	
<input type="checkbox"/> Flammable liquid, dust, lint, and oily deposits removed.	
<input type="checkbox"/> Explosive atmosphere in area eliminated.	
<input type="checkbox"/> Floors swept clean and trash removed.	
<input type="checkbox"/> Combustible floors wet down or covered with damp sand or fire-resistant/noncombustible materials or equivalent.	
<input type="checkbox"/> Personnel protected from electrical shock when floors are wet.	
<input type="checkbox"/> Other combustible storage material removed or covered with listed or approved materials (welding pads, blankets, or curtains; fire-resistant tarpaulins), metal shields, or noncombustible materials.	
<input type="checkbox"/> All wall and floor openings covered.	
<input type="checkbox"/> Ducts and conveyors that might carry sparks to distant combustible material covered, protected, or shut down.	
Requirements for hot work on walls, ceilings, or roofs	
<input type="checkbox"/> Construction is noncombustible and without combustible coverings or insulation.	
<input type="checkbox"/> Combustible material on other side of walls, ceilings, or roofs is moved away.	
Requirements for hot work on enclosed equipment	
<input type="checkbox"/> Enclosed equipment is cleaned of all combustibles.	
<input type="checkbox"/> Containers are purged of flammable liquid/vapor.	
<input type="checkbox"/> Pressurized vessels, piping, and equipment removed from service, isolated, and vented.	
Requirements for hot work fire watch and fire monitoring	
<input type="checkbox"/> Fire watch is provided during and for a minimum of 30 min. after hot work, including any break activity.	
<input type="checkbox"/> Fire watch is provided with suitable extinguishers and, where practical, a charged small hose.	
<input type="checkbox"/> Fire watch is trained in use of equipment and in sounding alarm.	
<input type="checkbox"/> Fire watch can be required in adjoining areas, above and below.	
<input type="checkbox"/> Yes <input type="checkbox"/> No Per the PAI/fire watch, monitoring of hot work area has been extended beyond the 30 min.	
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NFPA 51B	

8. Hot work conducted in enclosed spaces shall ensure that the area is clean of all combustible material; the area has been cleared of flammable material vapors; pressurized vessels, pipes, and accessories have been disabled, isolated, and adequately ventilated.
9. Fire watch and fire monitoring performed during the duration of hot work including at rest, and after completion of hot work for at least 30 minutes. This is done in the hot work location area; when necessary also in adjacent areas, below and above

from hot work locations.

With the enactment of the hot work permit, the risk of fire can be minimized as a result of welding. In addition, this hot work permit should be documented for the purposes of further reviews and improvements. As part of the hot work management, an audit can be done at any time to ensure the implementation of the hot work permit in the field in accordance with the procedures and senior management commitment to the risk area.

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