

PROCEDURE 28 - Welding/Hot Work

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Synopsis

The purpose of this procedure is to provide requirements relative to the hazards in the workplace associated with hot work. The procedure applies to all NWS facilities, welding work locations, and employees. The requirements of this procedure do not apply to soldering operations.

Initial Implementation Requirements:

- **Analyze Site Operations versus Procedure Requirements**
 - Establish/Evaluate Welding Areas. (28.3.1)
 - Inspect Established Welding Areas and implement Corrective Actions.(28.5.3c, 28.3.1i, 28.5.2c)
- **Develop/Obtain Documentation/Information required for Site**
 - Complete Hot Work Permit Form.(28.3.2)
- **Designate Person to Administer Welding/Hot Work Procedure Requirements**
- **Provide Local Training of Site Personnel**
 - Training of personnel performing hot work. (28.3.14c)
 - Fire Watch Training. (28.3.14b, 28.3.3c.2)
- **Designate Person for Contractor oversight (If applicable)**
- **Inventory Material/Equipment (Procure as required)**
 - Fire Extinguishers. (28.4.2b, 28.3.1c)
 - Mechanical Ventilation Systems. (28.4.2b, 28.3.1g)
 - Guards, Shields, Fire Blankets. (28.4.2b, 28.3.3a.2)
 - Flash Protection. (28.4.2b, 28.3.11d)

Annual Review and Recurring Task Requirements:

- **Perform Inspection/Assessment/Testing**
 - Conduct annual inspections of Established Welding Areas. (28.3.1i)
- **Review/Update Documentation/Information required for Site**
 - Maintain Training Records. (28.5.2b, 28.3.14)
- **Provide Refresher Training of Site Personnel (As required)**
 - Training of site personnel on Hot Work Hazards and Protective Measures. (28.3.14)
 - Fire Extinguisher Training. (28.3.14c)
 - Training on Equipment Use. (28.3.14c)
 - Fire Watch Training. (28.3.3c.2)
- **Inspect/Replace/Recalibrate/Maintain Material/Equipment (As required)**
 - Fire Extinguishers. (28.4.2b, 28.3.1c)
 - Mechanical Ventilation Systems. (28.4.2b, 28.3.1g)
 - Guards, Shields, Blankets. (28.4.2b, 28.3.3a.2)
 - Flash Protection. (28.4.2b, 28.3.11d)

Welding/Hot Work Checklist

| Requirements | Reference | YES | NO | N/A | Comments |
|--|-----------------------------------|------------|-----------|------------|-----------------|
| Is initial and annual review of this procedure conducted and documented? | 28.4.2 | | | | |
| Have all employees affected by this procedure, read, understood, and complied with the requirements of this procedure? | 28.5.4a | | | | |
| Are annual assessments of Established Welding Areas performed to ensure compliance with this procedure? | 28.3.1i 28.4.3 | | | | |
| Are Fire Watch and other NWS personnel affected by this procedure trained? | 28.5.2b & 28.3.14 | | | | |
| Are all Established Welding Areas approved and meet the requirements of this procedure? | 28.3.1a & 28.5.2c | | | | |
| Are there Class ABC Fire Extinguishers installed in welding areas where there is no sprinkler system? | 28.3.1c | | | | |
| Are the travel distances to the Fire Extinguishers less than 20 feet? | 28.3.1c | | | | |
| Is a Fire Watch present when all hot work is being performed? | 28.3.3c & 28.5.5a | | | | |
| Is a Fire Watch present for at least a half-hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires? | 28.3.3c | | | | |
| Are all Fire Watchers trained in the proper use of a Fire Extinguisher? | 28.3.3c.2 & 28.5.5b 28.3.14 | | | | |
| | | | | | |

| Requirements | Reference | YES | NO | N/A | Comments |
|---|---------------------|-----|----|-----|----------|
| Is ventilation available if the welding area does not have ceilings of at least 16 feet with no obstructions or the room does not provide at least 10,000 cubic feet of room volume per welder? | 28.3.1e | | | | |
| Are requirements listed in this procedure for welding specific materials being followed? | 28.3.1e,f | | | | |
| Does the Safety or Environmental/Safety Focal Point provide Hot Work Permits for work being performed in Non-Established Areas prior to commencement? | 28.3.2 & 28.3.12 | | | | |
| Is the Hot Work Permit read and signed by the person performing the hot work and the Fire Watch prior to commencement of the work? | 28.3.13 | | | | |
| When work cannot be moved, is the area made safe by removing combustibles or protecting combustibles from ignition sources? | 28.3.3a | | | | |
| Are special hazards or precautions noted on the Hot Work Permit, specific to the area in which the hot work is being performed? | 28.3.6 | | | | |
| Are combustible floors kept wet, covered with damp sand, or protected by fire resistant shields? | 28.3.3a.1 & 28.3.3e | | | | |
| Are guards, shields and/or fire blankets being used on all combustible materials within 35 feet of the hot work? | 28.3.3a.2 | | | | |
| Does all Hot Work in confined spaces meet the minimum requirements of this procedure and also NWS Occupational Safety and Health Procedure # 12, "Confined Space"? | 28.3.10 | | | | |
| Does management ensure that welders and supervisors are suitably | 28.3.14 | | | | |

| Requirements | Reference | YES | NO | N/A | Comments |
|--|-----------|-----|----|-----|----------|
| trained in the safe operation of their equipment and the safe use of the process? | | | | | |
| Are requirements of the NWS Occupational Safety and Health Procedure # 1, "Fall Protection" followed, if applicable? | 28.3.11a | | | | |
| Are welding leads and torch hoses and associated equipment being placed away from passageways, ladders and stairwells? | 28.3.11b | | | | |
| Is appropriate PPE being used in accordance with NWS Occupational Safety and Health Procedure # 8, "Personal Protective Equipment"? | 28.3.11c | | | | |
| Is flash protection provided in areas where pedestrian traffic may be exposed to the welding flash? | 28.3.11d | | | | |
| After open flame sweating takes place, does quenching of the pipe with a damp rag take place to reduce possible physical injury or fire by conduction? | 28.3.11e | | | | |

28 WELDING/HOT WORK

28.1 Purpose and Scope

As part of its goal to provide a safe and healthful workplace, the National Weather Service (NWS) is promulgating this procedure related to hazards in the workplace associated with hot work. This procedure applies to all employees at NWS facilities where welding is performed. The requirements of this procedure do not apply to soldering operations except as referenced in 28.3.7.

28.2 Definitions

Field Office. A Field Office may include the following: Weather Forecast Office (WFO), River Forecast Center (RFC), Weather Service Office (WSO), and a Data Collection Office (DCO).

Fire Watch. Individual dedicated to continuous surveillance of any hot work.

Hot Work. Any open flame/open arc activity such as, but not limited to, electric arc-welding, oxy-acetylene operations, air arc, plasma arc, and brazing.

NOTE: For the purpose of this procedure, hot work and welding shall be used interchangeably to designate welding, oxy-acetylene operations, air arc, plasma arc and brazing activities.

Hot Work Permit. A standardized form that certifies an evaluation of a planned hot work activity has been performed and specifies what precautions must be taken for the work to be performed safely.

Operating Unit. For the purpose of this procedure, Operating Unit includes the National Centers for Environmental Prediction (NCEP), National Data Buoy Center (NDBC), NWS Training Center (NWSTC), National Reconditioning Center (NRC), Radar Operations Center (ROC), or the Sterling Field Support Center (SFSC).

Station Manager. For the purpose of this procedure, the Station Manager shall be either the NWS Regional Director; Directors of Centers under NCEP (Aviation Weather Center, NP6; Storm Prediction Center, NP7; and Tropical Prediction Center, NP8; Space Weather Prediction Center, NP9); Directors of the NDBC, NWSTC, and Chiefs of NRC, ROC and SFSC facilities; or Meteorologist in Charge (MIC), Hydrologist in Charge (HIC), or Official in Charge (OIC).

28.3 Procedure

28.3.1 All hot work shall be performed in an Established Welding Area, if possible. Hot work performed in this area does not require a Hot Work Permit. Established Welding Areas shall meet the following criteria:

- a. The Established Welding Area shall be a discrete area, sectioned off by walls, curtains, or at a minimum, by lines on the floor. If lines on the floor are used, two areas shall be marked off with the lines:
 - (1) The Established Welding Area within which all welding must occur.

- (2) At least a 35-foot buffer area around the Established Welding Area which shall contain no combustible or flammable material.
- b. There shall be no exposed, readily combustible material such as paper, rags, wood, etc., within the Established Welding Area during welding. Walls, curtains and floors shall be made of combustion-resistant materials and shall have no cracks or openings into which sparks may fall and smolder.
- c. If possible, there shall be a fully operational, automatic fire protection system in the Established Welding Area. If a sprinkler system is not feasible, then there shall be a Class ABC fire extinguisher(s) installed in the welding area that is capable of extinguishing the largest fire reasonably expected to occur in the welding area. The travel distance to the extinguisher shall not exceed 20 feet.
- d. The area shall have at least one of the following as a permanent feature:
 - (1) A ceiling height of at least 16 feet with no obstructions to cross ventilation.
 - (2) At least 10,000 cubic feet of room volume per welder.
- e. Ventilation is required if the welding area does not have one of the features specified in “d” above or if hot work is performed which involves one of the following materials that may be present in the welding rods, welding gases, or on the base metal being worked: fluorine, zinc, beryllium, cadmium, mercury, lead, or stainless steel.
- f. If welding involves any of the materials listed in paragraph “3.e” above, the requirements listed in 29 CFR 1910.252, section (c) shall be adhered to. These requirements focus on ventilation and personal protective equipment usage.
- g. Mechanical ventilation shall take the form of local exhaust hoods or ventilation booths.
 - (1) Local exhaust hoods shall be placed as close to the work being performed as possible and shall maintain a minimum flow rate of 100 linear feet per minute at the point where the work is being performed.
 - (2) Ventilated welding booths shall have a top and at least two sides and maintain a face velocity of no less than 100 linear feet per minute away from the welder.
- h. Established Welding Area shall be a sufficient distance from, or separated from, flammable materials and/or duct work that may carry flammable materials or may carry sparks or hot slag to areas containing flammable or combustible material.
- i. The Established Welding Area shall be evaluated at least annually for adequacy and the evaluation shall be documented.

28.3.2 If hot work cannot be performed in an Established Welding Area, then a Hot Work Permit shall be issued by the Safety or Environmental/Safety Focal Point before the work may commence. A copy of the Hot Work Permit can be found in attachment A.

28.3.3 Fire Hazards. All potential fire hazards shall be removed from the area. Potential fire hazards include all flammable and readily combustible materials.

- a. If all potential fire hazards cannot be removed, then the following requirements shall be met:
 - (1) If flammable materials cannot be removed from the area or adequately covered/guarded, the hot work shall not be permitted.
 - (2) Guards, shields, and or fire-blankets shall be used to confine the heat, sparks and or slag from coming into contact with the combustible material within 35 feet of the hot work.
 - (3) All floor openings and cracks shall be closed, sealed and/or covered to ensure that sparks cannot drop into the openings and come into contact with combustible materials.
- b. Suitable fire extinguishing equipment shall be maintained in a state of readiness at all times for instant use. This may include fire extinguishers, water hoses or buckets of sand, depending on the nature of the combustible material exposed. This equipment shall be used in areas that have fixed suppression systems as well as areas without such systems.
- c. A Fire Watch shall be present to ensure that sparks, slag and heat generated by the hot work do not start a fire while the welder is working.
 - (1) The Fire Watch shall remain at the work location for at least a half hour after the hot work has been completed to ensure that no sparks or slag are smoldering and that the heat generated by the hot work did not cause some other material to smolder thus creating a potential fire hazard.
 - (2) The Fire Watch shall be trained in the proper use of fire extinguishing equipment and be prepared to use it.
 - (3) The Fire Watch shall also be aware of other potential hazards associated with the hot work activity such as exposure to welding fumes, welding flash and any other potential hazards unique to the area in which the work is being performed.
- d. Cutting or welding on materials that are in contact with combustible walls, partitions, ceilings or roofs shall not be done if the work is close enough to ignite these surfaces by means of conduction.
- e. If feasible, floors shall be wet down to prevent ignition.

28.3.4 Equipment shall be arranged so that it does not pose any additional hazards. Examples of such hazards would include placing a gasoline-powered welder near a ventilation intake, or placing an oxy-acetylene unit in an exit way.

28.3.5 Ventilation may be required when hot work is being performed due to the material on which work is being performed or due to fume build-up in small areas. The ventilation shall be equivalent to that required for Established Welding Areas to ensure the person performing the hot work and those working around them are not potentially exposed to the harmful materials.

28.3.6 Any special hazards or precautions specific to the area in which the hot work is being performed shall also be evaluated and noted on the permit.

28.3.7 Any open flame soldering, such as at the towers, shall follow the guidelines for Hot Work Activities. Depending on the type of solder used, respiratory protection may be needed, i.e. solder with lead present.

28.3.8 Hot work is prohibited from being performed in the following areas:

- a. Any area not authorized by the Station Manager.
- b. In buildings where the sprinkler system is impaired.
- c. In the presence of explosive atmospheres or areas in which an explosive atmosphere may develop due to improper cleaning of tanks or equipment that previously contained flammable materials or combustible dusts.

28.3.9 Ducts or conveyors that may carry sparks or slag to combustible materials shall be protected or shut down during hot work activities.

28.3.10 Hot work in confined spaces shall at a minimum meet the following requirements in addition to the requirements of the NWS Occupational Safety and Health Procedure 12, "Confined Space Entry."

- a. When the persons performing the hot work leave the confined space for lunch, breaks, etc., the welder shall be disconnected from its power source, the electrodes shall be removed from the leads, and the leads will be located so that accidental contact cannot occur.
- b. The valves of any torches used in the confined space as well as the valves on the cylinders supplying the torch shall be closed when not in use for a substantial period of time, such as during lunch or overnight. Where practical, the torch and hose shall be removed from the confined space when not in use.
- c. Gas cylinders and welders shall not be taken into the confined space. They shall be left outside of the space and the leads or hoses run into the confined space.
- d. Ventilation is required in confined spaces to prevent the accumulation of toxic materials or possible oxygen deficiency. The air replacing the air withdrawn shall be clean and breathable. No employee shall be exposed to a contaminant in excess of its OSHA Permissible Exposure Limit, Short Term Exposure Limit or American Conference of Industrial Hygienists Threshold Limit Value.

Additionally, no employee shall enter or work in environments with less than 19.5 percent oxygen by volume without a supplied air respirator or a self-contained breathing apparatus.

- e. Oxygen shall never be used for ventilation.
- f. Additional requirements shall be added depending on the nature of the confined space.

28.3.11 During hot-work activities the following requirements shall be met to provide minimal protection to personnel. Additional requirements shall be made depending on the nature of the work.

- a. All personnel performing hot work shall follow the requirements of NWS Occupational Safety and Health Procedure 1, "Fall Protection", if applicable. An example would be an unguarded elevated work surface.
- b. Welding leads and torch hoses and associated equipment shall be placed so that they are clear of passageways, ladders and stairwells.
- c. Personnel protective equipment shall be used in accordance with NWS Occupational Safety and Health Procedure 8, "Personal Protective Equipment."
- d. Flash protection shall be provided in areas where pedestrian traffic may be exposed to the welding flash.

28.3.12 The Safety or Environmental/Safety Focal Point shall issue Hot Work Permits when work shall be performed outside of Established Welding Areas.

- a. Prior to issuing the permit, the Safety or Environmental/Safety Focal Point shall evaluate the area in which the work is to be performed using the criteria in this procedure and shall specify the applicable requirements on the Hot Work Permit.
- b. If the Safety or Environmental/Safety Focal Point determines that adequate protection cannot be afforded to the personnel performing the work and other personnel working in the area or the facility, he/she shall not issue the permit until adequate protection can be provided.
- c. Each Hot Work Permit shall be specific for the area and type of work. At no time shall the location of the work or the work described on the Hot Work Permit change without obtaining another valid Hot Work Permit or an initialed modification of the original permit. Only the Safety or Environmental/Safety Focal Point may modify the original permit.
- d. Once the area has been evaluated and the permit is completed, the Safety or Environmental/Safety Focal Point shall sign the permit.

28.3.13 Persons performing hot work activities shall be aware of potential hazards in the area in which they are working and the requirements specified on the Hot Work Permit designed to mitigate these hazards.

- a. The person performing the hot work and the Fire Watch shall be required to read the Hot Work Permit and sign the permit acknowledging the fact that they understand the potential hazards and will follow the requirements of the permit. The person(s) performing the hot work and the Fire Watch shall sign the permit themselves. No one else may sign the permit for them.
- b. Once the hot work has been completed, the permit shall be returned to the Safety or Environmental/Safety Focal Point as soon as possible.

28.3.14 Training shall be provided initially to all personnel affected by this procedure and at any time there is a modification to this procedure that will affect work practices.

- a. The Safety or Environmental/Safety Focal Point shall be given training that will ensure that he/she has adequate knowledge to evaluate an area using the criteria in this procedure and is able to specify the requirements necessary to perform the work safely.
- b. The Fire Watch shall be trained in the proper use of the fire extinguishing equipment that he/she is expected to use as a Fire Watch. The Fire Watch shall also be trained in the use of any protective equipment or procedures necessary to protect himself/herself and other personnel in the area and the facility.
- c. Persons performing the hot work shall be trained in the proper use of the equipment they will be using to perform the hot work.
 - (1) They shall also be trained in the proper use of the fire extinguishing equipment that is provided for the use of the Fire Watch.
 - (2) They shall also be properly trained in the use of any protective equipment or procedures necessary to protect themselves or other personnel in the area and the facility.

28.4 Responsibilities

28.4.1 Regional or Operating Unit Environmental/Safety Coordinators

- a. Will monitor and promote compliance with the requirements of this procedure at field offices or Operating Unit facilities.
- b. Will ensure that applicable procedures are implemented at regional headquarters or Operating Unit facilities.

28.4.2 Station Manager

- a. Will have oversight over the implementation of this procedure and ensure that the requirements of this procedure are followed by individuals at the NWS facility.
- b. Will ensure that the Fire Watch and other NWS personnel affected by this procedure are trained in accordance with the requirements of this procedure and training records are maintained.

- c. Will ensure any designated welding areas meet the requirements of this procedure and approve the area for use as such and shall ensure that corrective actions are implemented.
- d. Will designate any areas in which hot work is prohibited.
- e. Will review or delegate review, of this procedure on an annual basis to ensure that the facility is complying with its requirements. Confirmation of this review shall be forwarded to the Regional or Operating Unit Environmental/ Safety Coordinator. This review shall include a spot check of the Hot Work Permits issued over the past year to ensure that they have been properly completed.
- f. Will ensure that initial and periodic inventory of fire extinguishers, guards, shields, fire blankets, flash protection and other safety equipment is accomplished and adequate stock is maintained.

28.4.3 Safety or Environmental/Safety Focal Point

- a. Will ensure that any responsibilities delegated to them by the Station Manager are implemented in accordance with the requirements of this procedure.
- b. Will issue hot work permits (if designated) in accordance with the requirements of this procedure and keep copies of issued Hot Work Permits for 18 months.
- c. Will perform an annual assessment of Established Welding Areas to ensure these areas are maintained in compliance with this procedure. These inspections shall be documented and kept on file for a minimum of 3 years.

28.4.4 NWS Headquarters (NWSH)

- a. The NWS Safety Office will provide assistance to Regional Headquarters, Operating Units, and field personnel to ensure that NWS facilities comply with requirements of this procedure.
- b. NWSH will coordinate with NOAA SECO, as necessary, regarding compliance issues related to this procedure.

28.4.5 Employees

- a. Individual employees affected by this procedure are required to read, understand and comply with the requirements of this procedure and report unsafe or unhealthful conditions and practices to their supervisor or safety focal point.

28.4.6 Fire Watch

- a. Will be present when all hot work is performed to ensure a fire is not started due to the hot work and shall remain at the location for a minimum of one-half hour after the work has been completed.
- b. Will be trained in the proper use of a fire extinguisher and be expected to use the fire extinguisher in the event of a fire.

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| NOTE: Reference NWS PD 50-11 for complete list of responsibilities http://www.nws.noaa.gov/directives/050/pd05011a.pdf |
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28.5 References

Incorporated References. The following list of references is incorporated as a whole or in part into this procedure. These references can provide additional explanation or guidance for the implementation of this procedure.

- 28.5.1 National Fire Protection Association, NFPA 51B, “Fire Prevention in Use of Cutting and Welding Processes.”
- 28.5.2 National Weather Service, NWS Occupational Safety and Health Procedure 12, “Confined Space Entry.”
- 28.5.3 National Weather Service, NWS Occupational Safety and Health Procedure 1, “Fall Protection.”
- 28.5.4 National Weather Service, NWS Occupational Safety and Health Procedure 8, “Personal Protective Equipment.”
- 28.5.5 National Weather Service, NWS Occupational Safety and Health Procedure 6, “Fire Protection.”
- 28.5.6 U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR 1910 Sub-part Q “Welding, Cutting, and Brazing.”

28.6 Attachments

Attachment A. Hot Work Permit (template)

**ATTACHMENT A
Hot Work Permit (Template)**

Hot Work Permit Number _____

VALID FROM _____ **EXPIRES** _____
Date Time Date Time

LOCATION OF WORK: _____

This Hot Work Permit is VALID.

Safety or Environmental/Safety Focal Point Signature

WORK REQUIREMENTS

Check All That Apply and Add Specifics

Fire Ext. _____

Cover Openings _____

Equipment Arrangement _____

Fire Suppression Equipment _____

Fire Watch _____

Relocate Combustible Materials _____

Ventilation _____

Wet Floors _____

Other Requirements _____

DESCRIPTION OF WORK: _____

I understand and will comply with all requirements on this permit.

Signature

Printed Name

Return this permit to the Safety or Environmental/Safety Focal Point immediately upon completion of work or permit expiration.