

WORK BOOKLET

FIRE PROTECTION

during hot work



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Fire protection during hot work

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1

Hot work

Hot work means work involving the use of tools and equipment that generate sparks and heat that could cause a fire. Hot work includes the use of open flames, hot air, welding, cutting and grinding equipment.

Knowledge is useful!



Statistics on fires caused by hot work
(Period from 1990 to 2019)

Exercise:

Why could the number of fires caused by hot work have gone down in recent decades?

Exercise:

Tick the box beside the equipment that can be used for hot work.

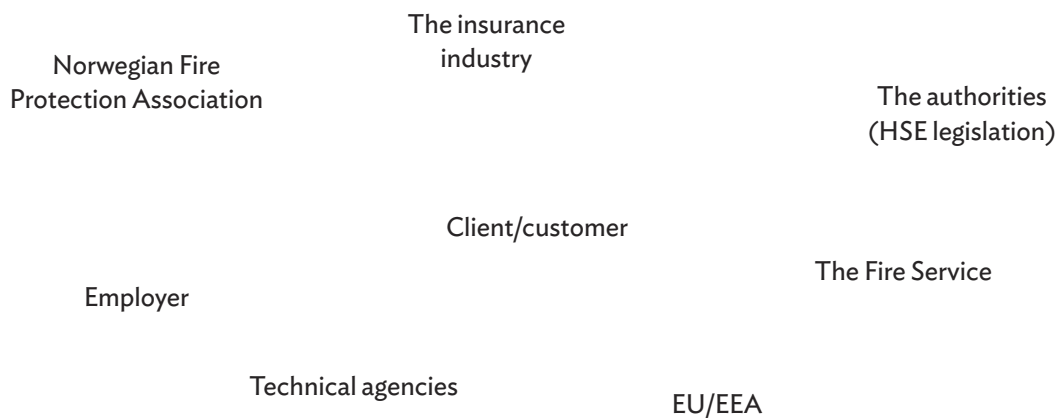
| | | | |
|-------------------|--------------------------|----------------|--------------------------|
| Gas burner | <input type="checkbox"/> | Angle cutter | <input type="checkbox"/> |
| Bolt cutters | <input type="checkbox"/> | Bayonet saw | <input type="checkbox"/> |
| Welding equipment | <input type="checkbox"/> | Hacksaw | <input type="checkbox"/> |
| Angle grinder | <input type="checkbox"/> | Building dryer | <input type="checkbox"/> |
| Hot air pistol | <input type="checkbox"/> | Weed burner | <input type="checkbox"/> |

Exercise:

Give three examples of work operations where the safety regulations apply.

Exercise:

Who sets requirements related to safety during hot work? Circle the correct answer(s).



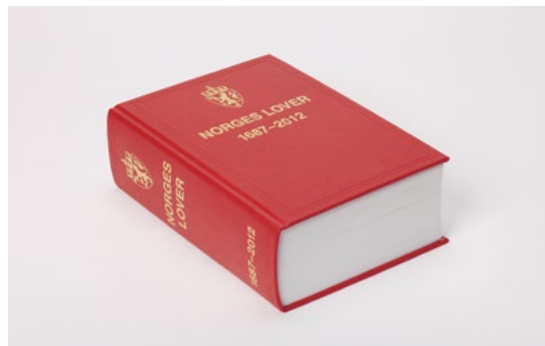
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Regulations

Public regulations

The requirement of due diligence is a key element of public safety regulations.

Displaying due diligence involves doing what is necessary to avoid or avert loss, disadvantage, injury or damage.



Important laws and regulations:

- The Working Environment Act
- Fire and Explosion Prevention Act
- Insurance Contracts Act
- Act relating to compensation in certain circumstances
- The General Civil Penal Code
- Construction Client Regulations
- Regulations related to fire prevention
- Regulations on the performance of work
- Regulations on the handling of hazardous substances
- Regulations relating to systematic health, environmental and safety activities in enterprises (Internal Control Regulations)

Summary of regulations:

1. Requirement for due diligence
2. Requirements for systematic safety work
3. Requirements for identifying risk
4. Requirements regarding measures taken to reduce hazards

Exercise:

Draw a line between laws/regulations and the most important requirements of the regulations

Oppgave:

Discuss what due diligence means in practice in relation to hot work.

Write down some keywords here:

Exercise:

Which of the following statements about public regulations is/are correct?

They make a requirement of due diligence

Norwegian laws make the same requirements as the safety regulations

No requirements are made in Norwegian regulations concerning hot work

They make a requirement of documentation of risk identification, assessment and measures

Exercise:

Who can be held liable for damages and/or incur criminal liability for damage caused by hot work?

For an overview of all current
laws and regulations:

www.lovddata.no

Kahoot-quiz:
www.kahoot.it



Insurance company requirements

Safety regulations for the performance of hot work apply to all environments with a risk of fire

The safety regulations consist of five parts:

1. Definition
2. Where do these safety regulations apply?
3. Agreements with external tradespeople/contractors
4. Security requirements
5. Work on roofs

The fire watch and person performing the work must hold a valid certificate for hot work



Exercise:

What is a safety regulation?

Exercise:

According to the safety regulations, what is required for a room to be defined as a specially designed room?

Exercise:

Which of the following statements about the safety regulations is/are correct?

The work instructions for the performance of hot work should be filled in and signed before hot work is performed

The person performing the hot work may act as fire watch in cases where the fire risk is considered low

Approved fire extinguishing equipment must be easily accessible

The fire watch must only be present after work has finished

Hot work on roofs:

Using an open flame on lined and ventilated wooden roofs is prohibited.

Exercise:

When do the safety regulations apply?

Exercise:

What is a causal connection?

The payment can be reduced, for example, if the fire started because the person performing the work:

- did not follow the safety regulations
- did not possess the knowledge required for the certificate
- had the knowledge, but did not employ it

Kahoot-quiz:
www.kahoot.it



3

Fire theory

Fire can be defined as an undesirable or uncontrolled combustion process.

The heat will generally be intense enough that the combustion process can be seen in the form of flames, glowing embers and smoke.



Heat transfer

- conduction
- radiation
- convection

Fire propagation

- conduction
- radiation
- convection
- flying fire

Exercise:

Which conditions must be fulfilled for a fire to start?

Exercise:

Is an open flame necessary for a fire to start?

Exercise:

Discuss the difference between spontaneous ignition, flashpoint and ignition temperature.

Exercise:

Which of the following statements are correct concerning the spread of heat?

A Heat can be spread by convection

B Heat can be spread by convection in water

C Heat can be spread by sparks flying through the air

D The heat generated during hot work is not high enough to start a fire

Exercise:

In which four ways can fire spread?

Welding, cutting and grinding create a shower of sparks. These hot particles can ignite flammable or combustible materials well away from the workplace itself.

Kahoot-quiz:
www.kahoot.it



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Extinguishing fires

The safety regulations for hot work say the following on the requirement for extinguishing equipment:

“Suitable extinguishing equipment in proper condition, minimum 2 pcs. 6 kg/litre portable extinguishers must be easily accessible. One portable fire extinguisher may be substituted with a fire hose with water turned on up to the nozzle.”



The choice of the best method and extinguishing agent depends on the material that is burning.

Exercise:

Name four fire extinguishing methods.

Exercise:

What is the challenge associated with extinguishing glowing embers with powder?

| Extinguishing agent | Class | Material |
|---------------------|--------|-----------------------------------|
| Water | A | Organic solids |
| Foam | AB | Organic solids and liquids |
| Powder | ABC/BC | Organic solids; liquids and gases |
| CO ₂ | B | Liquids |

Exercise:

How do you extinguish a gas fire?

Exercise:

Which statements about the inspection and service of extinguishing equipment is/are correct?

- A Powder extinguishers should be serviced every 5 years
-
- B Foam extinguishers should be serviced every 5 years
-
- C All extinguishing equipment must be inspected annually
-
- D CO₂ extinguishers should be serviced every 5 years
-

In the event of fires in clothing it is important to remember the following:

- Lay the person down horizontally.
- Then extinguish the fire in the clothing.
- Cool down any burn injuries.

Kahoot-quiz:
www.kahoot.it



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Dangers of hot work

Both the tools used and the way the work is performed can cause fire or explosion. It is therefore vital to be aware of the dangers associated with the various tools and types of work.

Exercise:

Which of the following statements about the storage of gas cylinders is/are correct?

- A Propane cylinders should be stored on their sides
- B Propane cylinders should be stored upright
- C Acetylene cylinders stored on their sides can lead to the release of acetone
- D Gas should always be stored below ground level

Exercise:

Why are propane leaks particularly dangerous?

Exercise:

Which statements about oxygen is/are correct?

- A Oxygen is the same thing as air
- B Oxygen contributes to a strong increase in ignitability
- C Oxygen that comes into contact with fat and oil can cause spontaneous ignition
- D It is safe to use oxygen to blow clean work clothes

Exercise:

Name some known hazards of performing hot work on roofs.

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Exercise:

What do the safety regulations say about using open flames on roofs?

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Exercise:

Why must extra caution be exercised when performing hot work on tanks and in confined spaces?

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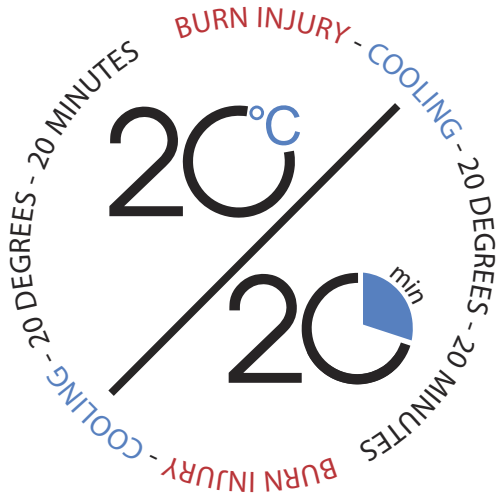
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Exercise:

What do you think are good measures to avoid personal injury in connection with hot work?

In case of a burn injury:

6

Risk – identification, assessment and measures

Risk can be expressed as the product of:
the likelihood and consequences of an undesirable incident.
Risk = likelihood x consequence

Exercise:

Why is it important to identify risk?

Exercise:

Give examples of questions that are central to a risk assessment.

Risk assessments must be documented in writing!
Internal Control Regulations
+
safety regulations for hot work

Exercise:

When assessing risk, the person performing the hot work must consider the method, material and environment. Discuss important factors to consider when it comes to:

| Method | Material | Environment |
|--------|----------|-------------|
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| | | |
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Exercise:

What is meant by the duty to provide information and the duty to investigate?

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Exercise:

Give examples of measures that should be implemented to prevent fires during hot work.

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Exercise:

What are the requirements for the fire watch?

Exercise:

For how long must the fire watch remain on duty after the work has been finished?

- A Minimum 30 minutes
- B Minimum 1 hour
- C Maximum 2 hours
- D As long as there is a risk of fire

Kahoot-quiz:
www.kahoot.it

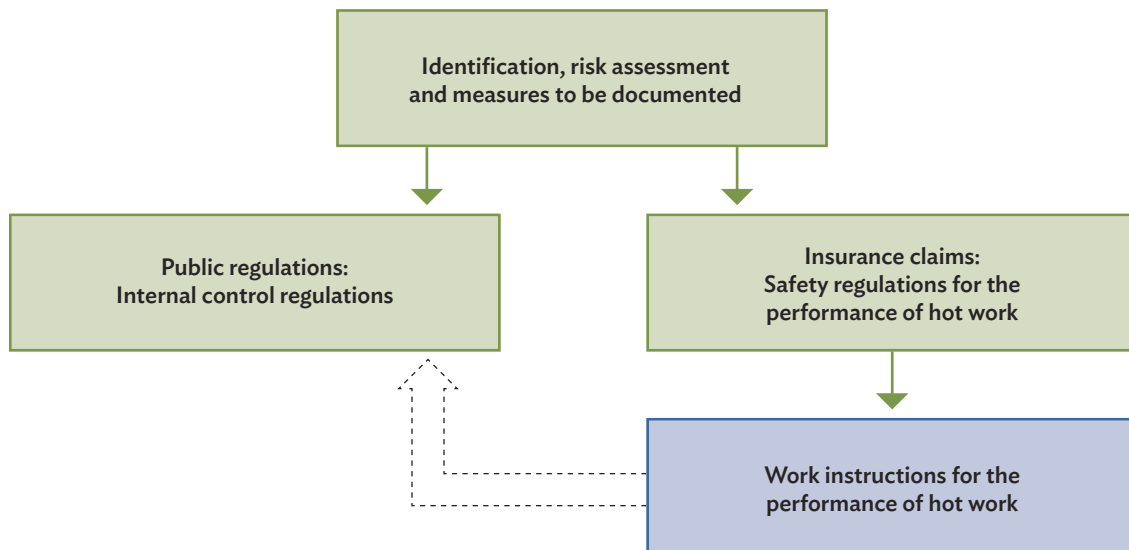


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Safety documentation

Companies that carry out hot work must identify the risk of undesirable incidents related to health, safety and the environment (HSE).

Companies must implement and document in writing measures to reduce the risk of undesirable incidents



Exercise:

Discuss the extent to which the work instructions satisfy the Internal Control Regulations requirements related to fire prevention measures.

Exercise:

Give examples of fire prevention measures relating to the performance of hot work.

Kahoot-quiz:
www.kahoot.it



Work instructions for the performance of hot work

The work instructions consist of 17 safety requirements that must be assessed and completed.

In addition, the work instructions include information about who holds which roles and responsibilities relating to the task in hand.

All responsible parties must sign the work instructions before the work starts.

Exercise:

Who should sign the hot work instructions? Circle the correct answer(s).

| | | |
|-----------------------|----------------------------------|------------------------------|
| The insurance company | Private homeowner | |
| | Property owner | |
| | | Client/ customer |
| Employer | Fire watch | |
| | The party performing the work | The performer of hot work |

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Exercise:

According to the work instructions, you must assess the risk associated with combustible insulation and hidden cavities in the construction. How would you conduct such an assessment?

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Exercise:

What do the work instructions require with regard to fire detectors?

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Exercise:

If there is a particularly high risk of fire, what measures should be taken for extra preparedness?

Exercise:

What do the work instructions say about follow-up inspections?

Exercise:

The performer of hot work and the fire watch must be familiar with the emergency numbers and procedures for reporting fires and accidents. What information should be clarified before work begins?

Exercise:

What should the fire watch be particularly on the lookout for after the work has finished?

**Exercise:**

What must be done before the fire alarm system can be reconnected?

8

If a fire starts

Exercise:

What things is it particularly important to tell the Fire Service about?

**ACTIONS TO TAKE
IN THE EVENT
OF FIRE**
Notify
Extinguish
Save

Exercise:

If a fire starts, you must take the following actions: notify, extinguish and save.
Discuss important factors to consider when it comes to:

Notifying

Extinguishing

Saving

| Notifying | Extinguishing | Saving |
|-------------------|-------------------|-------------------|
| <hr/> <hr/> <hr/> | <hr/> <hr/> <hr/> | <hr/> <hr/> <hr/> |



Exercise:

How can you limit the extent of a fire?

Exercise:

Why is it important to clean the area of the fire after it has been extinguished?

Exercise:

How would you handle a gas fire involving gas cylinders?

Kahoot-quiz:
www.kahoot.it

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After a fire

All fires and outbreaks of fire must be reported to the employer/client.

This is so that the employer/client can initiate fire prevention measures and safeguard the company's internal control system.

Exercise:

Why is it important for an organisation to register all fires and outbreaks of fire?

Exercise:

When should the Norwegian Labour Inspection Authority be notified in the event of fire?

Exercise:

Who has an obligation to notify the Norwegian Labour Inspection Authority in the event of personal injury?

Exercise:

Who can incur civil and criminal liability? Circle the correct answer(s).

Client/employer

Property owner

Private homeowner

The party performing the work

Employer

The performer of hot work

Caretaker

Fire watch

Exercise:

Companies that have been affected by fire could face many challenges. What challenges do you think might arise after a fire?

If the safety regulations were breached, and a causal connection can be shown between the breach and the fire, the insurance company will be able to limit the amount they pay out.

Kahoot-quiz:
www.kahoot.it



