

Hot Work

Guidelines for fire protection

The present guidelines is non-binding. In individual cases, the insurance provider can also accept other safety precautions or installation and maintenance companies under conditions set at its own discretion which do not comply with these technical specifications or guidelines.

1 Preliminary remark

The guidelines for fire protection during hot work were prepared and set up jointly with the Trade Association for Metallurgical Plants and Rolling Mills – (HWBG), the Machine Construction and Metal Trade Association (MMBG). and the Federal Association of German Industry e.V. (BDI)

2 Scope

The scope of the guidelines extends to all hot work such as soldering, hot gluing, welding, flame cutting, cut-off grinding or related processes which are carried out outside of the worksites intended for these purposes. The guidelines do not replace either the legal regulations or possible safety directives (e.g. VdS 2047 Safety directives for hot work) which were agreed on in the insurance policy, but rather supplement these where applicable.

3 General information

A risk assessment is to be carried out in accordance with the Plant Safety ordinance and Hazardous Material ordinance. Before starting hot work, a general check should be made for the firm establishment of the risk assessment as to whether cold processes (sawing, screwing, cold gluing etc.) can replace this work. The usage of welding, cutting, cut-off grinding, soldering, thawing and hot gluing devices, which can result in consider-

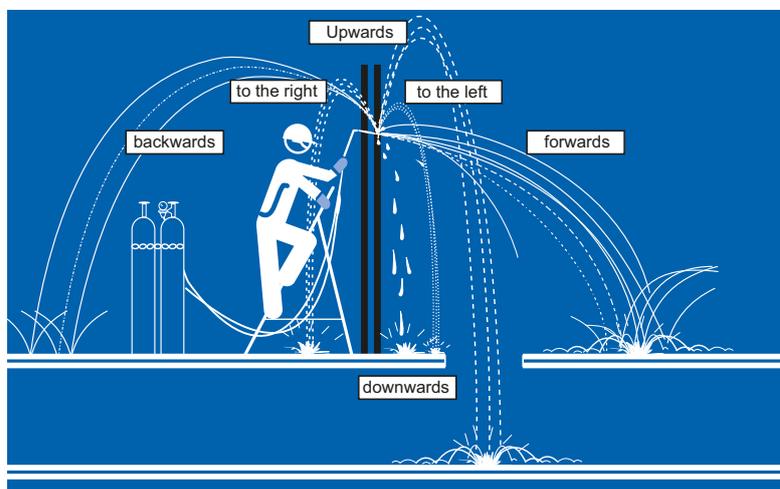


Fig. 1: Dispersal pattern of hot particles during welding work

able temperatures, often present an enormous fire hazard. Above all, fires are caused by:

- open welding flames (ca. 3200 °C),
- electric arcs (ca. 4000 °C),
- soldering flames (ca. 1800–2800 °C),
- welding, cutting and grinding sparks (ca. 1200 °C),
- dripping, glowing metal (ca. 1500 °C),
- heat conduction of strongly heated metal parts and hot gases

Welding, grinding and cutting sparks, which can ignite burnable materials 10 m or more from the work site, are particularly dangerous

Only properly trained persons over 18 years of age may perform hot work in areas presenting a fire hazard. Trainees may only perform the work under supervision.

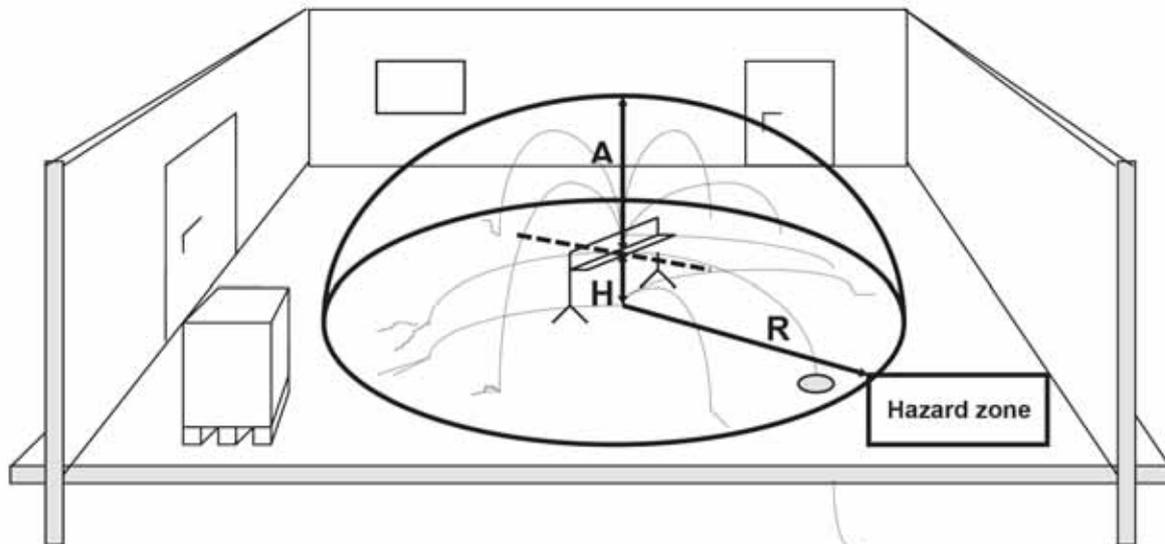


Fig. 2: Hazard zone

When a contract is awarded, the relevant directives about the coordination of the cooperation of several companies must be followed. Whether and who will set up the fire guards and the required fire watch should be specially determined no later than the beginning of the hot work. Persons intended as fire guards must be trained accordingly.

4 Permit

A written permit must be obtained from the company assigning the contract (client, insurance holder) or a representative of the client before beginning hot work. The permit for work posing a fire hazard (e.g. VdS 2036 Permit for hot work) is linked to a concrete work agreement (works) and unchanging environmental conditions and work processes. If these circumstances change, the risk assessment and the permit procedure must be carried out anew.

In the case of work lasting for longer periods of time, the table printed in Chapter 11 can be used as a supplement to the permit for hot work. Independent of this, the requirements of the trade associations must be observed.

5 Hazard zones

The existence of hazard zones is dependent on the respective procedure; they are listed in the table¹⁾ and schematically displayed in Figure 2.

At work heights above 2 m the lateral radius (R) of all manually performed hot work must be increased by 0,5 m for each additional meter of work height (H).

Manual Hot work	Lateral radius R_{normal} Work height ≤ 2 m	Clearance (A) upwards
Soldering, hot gluing	2 m	2 m
Welding Gas and arcs	7.5 m	4 m
Flame-cutting Independent of gas beam pressure	10 m	4 m
Cut-off grinding	6 m	3,5 m
Note: Work height ≥ 2 m $R_{\text{gross}} = R_{\text{normal}} + 1/2 (H - 2 \text{ m})$ H = Height of the work site above ground level Depending on the worksite, e.g. in the case of floor openings, the hazard zone (depth) can also extend downwards.		
Table 1: Hazard zones		

1) cf. Michael Otte, s+s report No. 4, August 1998

6 Safety measures – before starting work –

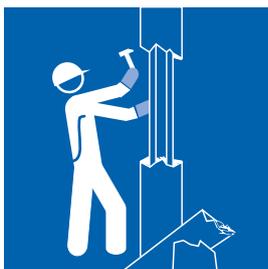


Removal of all mobile burnable objects and materials – also dust deposits – from the hazard zone; this can also extend to bordering rooms.

Fig. 3

Note: Particularly when working with piping, lines transporting hot oil, steel beams and the like, the conduction of heat can cause flammable materials to ignite in bordering rooms. Such materials must therefore be removed before starting work.

Installation of gas tanks outside of the hazard zone.



Removal of sheathing and insulation from the hazard zone (when working on pipelines, tanks and vessels).

Fig. 4



Sealing of openings, joints, scratches, pipe/cable lead-throughs and open pipelines which run from the hazard zone to other rooms with non-flammable materials; Suitable materials include plaster, mortar, clay, steel wool or fire protection materials. In no case may cloths, paper or other flammable materials be used.

Fig. 5



Covering of stationary, but flammable objects in the hazard zone such as wooden beams and walls, floors, machines and plastic parts with mineral fibre covers and plates or similar materials.

Fig. 6



Fig. 7

Setting up a fire watch with suitable extinguishing devices for the work site and its surroundings if flammable materials are present in the hazard zone; suitable extinguishing devices include buckets of water or a connected water hose – even better are fire extinguishers and wall hydrants. (Also see VdS 2001/BGR 133)

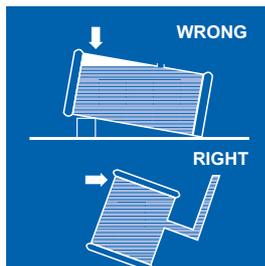


Fig. 8

Inspection of containers and pipelines for their earlier content; if they contained flammable/explosive materials or the earlier content can no longer be determined, then the containers must be cleaned and filled with water before starting work; otherwise, they must be filled with a suitable agent such as flame-smothering inert gases like nitrogen or carbon dioxide, or with foam. When using smothering gases, observe the risk to humans.



Fig. 9

Note: Insofar as no company ban prohibits it, the use of mobile phones, particularly at exposed worksites is recommended.

Inform both the person assigned to the hot work as well as the fire watch about the location of the nearest fire alarm and/or telephone including telephone number.

Should fire protection systems (e.g. fire extinguishing and alarm systems) be temporarily out of service, then both the fire department and the fire insurance provider are to be informed (obligation). If required, substitute fire protection measures are to be provided in coordination with the fire brigade and the fire insurer. Fire protection measures particularly must be implemented for flame operations in the roof area. The information sheet VdS 2216, Fire protection measures for roofs contains tips about this.

7 Safety measures – while working –

One must absolutely always ensure that no combustible objects or materials become endangered or ignited by flames, sparks, melted droplets, hot gases and vapours or due to heat conduction.

- Components endangered by heat conduction must be cooled with water.
- The work site, including all rooms adjacent, above and below, must be continuously monitored for possible sources of fire.
- Suitable functioning extinguishing devices must be kept at hand.
- Stop work immediately in case of fire, notify the fire brigade and begin combating the fire without delay.

8 Safety measures – after completion of work –

Experience shows that many fires do not start until several hours after completion of the hot work. For this reason, (several) diligent follow-up checks are particularly important.

It is additionally required that the fire guard carefully inspect the work site and its surroundings for burning smells, suspicious heating, glowing sites and fire nests. This check can be required at short time intervals over several hours until the possibility of a fire can be safely excluded.

Note: If components bordering fire areas were broken during the work, then these openings (possibly at first tentatively) must be closed with common sealing agents approved by the building authorities. Depending on the situation, the use of a mobile fire alarm system on site can be a good idea. Further information is available from the fire insurance provider.

9 Literature

General literature

Investigations of the range and ignition effect of glowing particles and dimensioning of fire-endangered zones

Michael Otte; s+s report No. 4, August 1998

Laws and ordinances, official guidelines, regulations and recommendations

Industrial Safety Act (ArbSchG)

from 07 August 1996 (BGBl. I S. 1246)

Bundesanzeiger Verlagsgesellschaft mbH
Postfach 1320, 53003 Bonn
Internet: www.bundesanzeiger.de

Industrial Safety Regulation (BetrSichV)

BGV A1 General directives and

BGR 133 Equipping of worksites with fire extinguishers

BGR 500 Operation of work equipment/Part 2, Chapter 2.26

Carl Heymans Verlag KG
Luxemburger Str. 449, 50939 Cologne
Internet: www.heymanns.de

VdS Publications

VdS 2001 Rules for equipping worksites with fire extinguishers

VdS 2036 Permits for hot work

VdS 2038 General safety directives of the fire insurers for factories and commercial installations (ASF)

VdS 2047 Safety directives for flame operations

VdS 2216 Fire protection measures for roofs

VdS Schadenverhütung GmbH
Amsterdamer Str. 174, 50735 Cologne
Internet: www.vds.de

10 Sample permit for hot work

Permit for hot work		
like <input type="checkbox"/> Welding, cutting and related processes (welding permit) running number: _____ <input type="checkbox"/> cut-off grinding <input type="checkbox"/> soldering <input type="checkbox"/> melting <input type="checkbox"/> hot gluing work <input type="checkbox"/> _____		
1	Work location/site	
	Fire/explosive zone	Spatial expansion around the worksite: Perimeter (Radius) ofm, Height ofm, Depth ofm
2	Work assignment (e.g. separate supports) Work process	To be performed by (Name):
3	Safety measures in case of fire	
3a	Removal of fire hazard	<input type="checkbox"/> Removal of combustible materials and objects, possibly also dust deposits <input type="checkbox"/> Removal of wall and ceiling panelling, insofar as they cover or hide combustible materials or are combustible in themselves <input type="checkbox"/> Covering of stationary combustible materials or objects (e.g. Wood beams, walls, floors, objects, plastic parts) With suitable agents and possibly moist. <input type="checkbox"/> Covering of openings (e.g. joints, scratches, breakthroughs in the walls, pipe openings, grooves, chimneys, ducts, neighbouring areas with clay, plaster, mortar, moist earth, etc.) <input type="checkbox"/>
		Name: _____ Performed: _____ (Signature) _____
3b	Provision of fire extinguishers	<input type="checkbox"/> Fire extinguisher with <input type="checkbox"/> Water <input type="checkbox"/> Powder <input type="checkbox"/> CO ₂ <input type="checkbox"/> _____ <input type="checkbox"/> Extinguishing blankets <input type="checkbox"/> Connected water hoses <input type="checkbox"/> Water-filled buckets <input type="checkbox"/> Informing the fire brigade <input type="checkbox"/>
		Name: _____ Performed: _____ (Signature) _____
3c	Fire guards	<input type="checkbox"/> During the hot work Name: _____
3d	Fire watch	<input type="checkbox"/> After completion of the hot work Duration: _____ Hours Name: _____
4	Safety measures if risk of explosion	
4a	Removal of the explosion risk	<input type="checkbox"/> Removal of all explosive materials and objects – also dust deposits and containers with hazardous content or its residues <input type="checkbox"/> Resolve risk of explosion in pipelines <input type="checkbox"/> Cover stationary containers, devices or pipelines containing flammable liquids, gases or dust, if necessary in connection with air-related measures <input type="checkbox"/> Taking air-related measures in accordance with EX-RL in connection with dimensional monitoring <input type="checkbox"/> Setting up of gas-warning devices for _____ <input type="checkbox"/>
		Name: _____ Performed: _____ (Signature) _____
4b	Monitoring	<input type="checkbox"/> Monitoring of safety measures for effectiveness Name: _____
4c	Removal of safety measures	Upon completion of the hot work after _____ hour/s Name: _____
5	Alerting	Site of the nearest Fire alarm _____ Telephone _____ Fire brigade number _____
6	Assigning company (client)	The measures according to 3 and 4 are responsible for hazards caused by the local relationships _____ Date _____ Signature of the plant manager or his representative in accordance with § 8 Para. 2 ArbSchG
7	Executing company (Contractor)	The work according to 2 may not be started until the safety measures in accordance with 3a to 3c and/or 4a/4b have been carried out _____ Datum _____ Signature of the contractor or his representative
		Taken note of by the executor in accordance with 2 _____ Signature

Original given to the executor – 1st Copy for the client – 2nd copy for the contractor

11 Sample for the organization of hot work over a longer period of time

Permit for hot work from ____/____/____; running No. ____ - (only valid for CW ____/20____)															
1. Fire guards during the hot work															
	MO	TUE	WED	TH	FR	SA	SO								
Name - early shift															
Name - late shift															
Name - night shift															
2. Fire watch after completion of the hot work															
	MO	TUE	WED	TH	FR	SA	SO								
Responsible person															
check	Time	Abbrev	Time	Abbrev	Time	Abbrev	Time	Abbrev	Time	Abbrev	Time	Abbrev	Time		
check															
check															
check															
check															
3. Switching alarm groups on and off – time of switching on/off															
	MO	TUE	WED	TH	FR	SA	SO								
switched off															
switched on															
Responsible person															
Signature															
4. Switching automatic extinguishing units on and off – time of switching on/off															
	MO	TUE	WED	TH	FR	SA	SO								
switched off															
switched on															
Responsible person															
Signature															
5. Responsible persons															
Name of client: _____															
Name of contractor _____															
Telephone _____				Mobile: _____				Telephone _____				Mobile: _____			
Signature _____				Signature _____				Signature _____				Signature _____			

Editor: Gesamtverband der Deutschen Versicherungswirtschaft e.V. (GDV)

Publishing house: VdS Schadenverhütung GmbH
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