COSHH 2002 (as amended)	THIS FORM IS DESIGNED FOR USE BY OCCUPATIONAL HYGIENISTS, HEALTH & SAFETY PROFESSIONALS AND TRADE ASSOCIATIONS. IT SHOULD HELP TO SYSTEMATICALLY APPLY EACH PRINCIPLE.	**Appendix 1: SUMMARY POINTS & CHECKLIST FORM** Principles of good practice worked example: welding fume
Introduction to the Principles	The Principles of good control practice: Regulation 7(7) on adequate control and Schedule 2A. Note the requirement, (Regulations 7.1 and 7.2) first to consider prevention, process change or substitution. The Principles are a 'package'. Apply them all to get effective, reliable and sustainable exposure control. You cannot pick and choose which Principles to apply – they are all important in getting adequate control. The Principles have no rank order, though there is a logical progression in how they are presented and considered. You do not need rigidly to work your way sequentially from Principle (a) to Principle (h). Apply the principles in whatever way suits your purpose, but apply them all. Refer also to associated COSHH Guidance.	This 'Summary Points and Checklist Form' helps you apply the Principles. Because these overlap in their application there are, at certain points, some repetition. Where there is clear repetition, the form will auto-complete. For instance, Principle (d) requires you to list the key elements in the exposure control measures and Principle (f) asks you to summarise the key 'Hardware' and 'Software' elements. Not all aspects of the Principles apply to every circumstance. For example, dust or vapour extraction is irrelevant where surface contamination and skin absorption are the source of exposure. It takes a little time to consider and apply the Principles. But you need to do this just once per process, activity or task. The Form helps you identify when, where and by whom further work is needed. Record what needs to be done. Once the Form is complete and agreed, take the findings and include them in your risk assessment.

	Use the findings recorded in the Form (and any other documents) to develop simple instructions for operators, supervisors, those who check and maintain control measures and those who review the controls. Make the key findings known as clearly as possible to all those that need to know and to act. You often need different ways to tell different people the same messages.	
Note	*The objective of COSHH is to prevent, or adequately control, exposure to substances hazardous to health*	
	Name of task/job/process:	**Assessor:** **Date:**

Principle (a)	Design and operate processes and activities to minimise emission, release and spread of substances hazardous to health		
	Guidance points and checklist	**Responses and action notes**	**Action**
	Identify the source(s) of exposure		
1a	How is exposure caused through emission?	Choice of welding method. Adjustment of welding settings	
1b	How is exposure caused through release?		
1c	How is exposure caused through spread?	Segregated from other work, including welding screens. Open air or general ventilation	
2a	Which groups of workers are potentially exposed?	Welders and cutters	
2b	Are other groups potentially exposed, e.g. cleaners, maintenance workers?	Others in the same workplace	
2c	What determines duration of exposure?	Welding time and trigger time	
3a	What are the main and significant sources of exposure?	Plume of welding fume direct from the weld. Fume prevented from escaping from confined and enclosed spaces. Background levels of fume in the welding shop	
3b	What are the main substances of exposure?		
3c	What modes of exposure – inhaled, skin contact, skin uptake, ingested?		
	For each group exposed:		
4a	How can the number of sources be reduced?	Usually it will not be possible to reduce sources of welding fumes, but it may be possible to confine welding activities to designated areas	
4b	How can the size and/or rate of emission/release be reduced?	Choose a lower-emission technique – e.g., MIG in place of MMA. Adjusting the welding-set settings has an effect on the quantity of fume, but the relationships are not clear. Can only be challenged if the firm has settings approved for, e.g., quality.	
4c	How can duration of exposure be reduced?		
4d	Is segregation of large of diffuse sources possible? How?	Give additional consideration to welding and cutting processes which may give rise to excessive amounts of fume	
4e	Which sources need enclosure?	Automated welding and cutting. Submerged welding	
4f	Which sources need extraction (gas, fume, vapour, mist, dust)?	1. Where possible, LEV should be designed to control fume from all parts of the workplace without adjustment e.g., a booth. Face velocity 0.5-1.0 m/s. 2. Adjustable, point-extraction hoods are generally only suitable for small welds performed one at a time. Face velocity 10-15 ms-1. 3. Large hoods and very high flow rates are required for some cutting methods such as arc-air gouging.	
4g	Is existing extraction effective – does it match the source?	1. All workpieces should fit within any booth, down-flow bench, etc. 2. Point extraction hoods should be adjusted so that they are very close to the weld and take advantage of thermal lift.	
4h	Is existing extraction applied and used properly?		
4i	How might controls fail?	1. Workpiece is not within LEV capture zone. 2. LEV is not working correctly. 3. RPE is not fitted correctly or it is damaged, dirty or poorly maintained. 4. Work methods and practices are not followed.	
4j	What emergency arrangements exist for such failure?		
5a	What is the existing work method?		
5b	Was this work process or method designed to minimise exposure?		
5c	How could the work method change to minimise exposure?	Work so that the welders face is not in the plume of fume.	
			Page 1

Principle (b) Take into account all relevant routes of exposure – inhalation, skin and ingestion – when developing control measures			
	Guidance points and checklist	**Responses and action notes**	Action
	Which routes of absorption are relevant to exposure: Which substances are relevant to exposure	0	
1a	How does the contaminant get into the air to cause exposure?	Exposure to welding fume is significant by inhalation only. Note also hazards from shield gases, ozone and Nox	
1b	How does contaminant spread through the air?	The highest exposure are from direct fume, especially if the welders face is in the visible fume. Fume in the atmosphere of the workshop will add to welders' exposure and cause other workers to be exposed.	
2a	How is the contaminant released to contaminate skin?		
2b	How does the contaminant spread beyond the area of use?		
3	How might ingestion occur?	Where dusts of toxic metals, such as lead, may be present there may also be a risk of ingestion.	
4a	Which are the main sources of exposure? List them.	1. The welds or cuts cause the greatest volume of fume, especially MMA, FCA, arc-air gouging. 2. The welding or cutting of stainless or other special steels. 3. Confined or enclosed spaces and poor work positions which place the welders face in the fume. Other sources: Welding of mild steel using MIG	
4b	Which are the most important?	The welds or cuts cause the greatest volume of fume, especially MMA, FCA, arc-air gouging.	
			Page 2

Principle (c)	Control exposure by measures that are proportionate to the health risk		
	Guidance points and checklist	**Response and action notes**	**Action**
1	What are the potential health risks – long-term effects?	1. Progressive long-term decrease in lung function and possible COPD. 2. Asthma from metal such as chromium and nickel, or irritating gases such as ozone and Nox. 3. Lung cancer, especially from recognised carcinogens such as nickel and chromium.	
	Is there sufficient information to make decisions about:		
1a	Risks to health?	1. Consumables suppliers provide analysis of welding fume constituents. 2. Control of fume containing known asthmagens or carcinogens should be as low as reasonably practicable.	
1b	What exposure level will protect people's health?		
1c	Control measures likely to control the risk?		
2	What are the potential health risks – short-term effects?		
	Is there sufficient information to make decisions about:		
2a	Risks to health?		
2b	What exposure level will protect people's health?		
2c	Control measures likely to control the risk?		
	For the contaminants or processes, are there:		
3a	Workplace Exposure Limits (WELs)?	There are WELs for all common metal components of welding consumables	
3b	Other exposure standards?		
3c	Are these standards well-founded?	Note that the previous OES for welding fume was not well founded and has been withdrawn.	
3d	What fraction of this standard should exposure be kept below?	Control of fume containing known asthmagens or carcinogens should be as low as reasonably practicable. There are no known NOAELs.	
3e	Is there guidance on adequate control measures? What is it?	Welding Essentials is available on the HSE website at http://www.hse.gov.uk/welding/guidance/index.htm	
3f	Is health surveillance needed?	Health monitoring usually needed.	
4a	Are the controls sufficiently effective to give adequate control?	High hazard: E.g., Nickel >6%, Chromium >15%, Beryllium, Cobalt, cadmium. Is visible fume captured by LEV?	
4b	Will the proposed controls give adequate control?	High exposure tasks: Is the welding method chosen to minimise fume? MMA/FCA high; MIG/MAG medium, TIG low. Is the welding activity organised to minimise exposure to fume? Is LEV well-designed and well-positioned? Is RPE worn correctly?	
	The control must meet the challenge. This depends on the size and number of sources, workplace layout, etc		
5a	How often will control measures be reviewed? (at least annually)		
5b	By whom?		
5c	Next review?		
6	Have you considered productivity and/or quality gains alongside health and safety?		

Note: Suppliers, trade/industry associations, specialist advisors, and HSEs 'Chemicals' webpages are some of the information sources that may be useful

Principle (d)	Choose the most effective and reliable control options that minimise the escape and spread of substances hazardous to health		
	Key questions: When can a control option be applied? How much will it reduce exposure? How reliable will it be?		
	Guidance points and checklist	**Responses and action notes**	**Action**
1	Can the process be modified or the material replaced so as to prevent exposure? *(Regulation 7.1)*		
2a	How did you select the people to develop the control measures?		
2b	Did they have the right knowledge, skill and experience?		
	Can you make modifications to reduce emission and/or spread:		
3a	Process modifications?		
3b	Material modifications?		
3c	Workplace modifications?		
4a	Can you enclose the process to limit emission or spread?	Important for automated processes. Is welding segregated from other activities?	
4b	Can you use extraction or suppression to limit emission or spread?	Applied controls (List): Consider whether the LEV available is suitable for the type of work being done: Adjustable hoods are often not suitable for long welds or where there are many small isolated welds. Welding on jigs often lends itself to both downflow tables. Welding in confined or restricted areas may require fan-assisted make up air.	
4c	List the controls. Include supervision.		
5	Confirm the criteria for PPE selection as a control solution	Is RPE being used in conjunction with other controls or alone?	
6	How do the work methods contribute to exposure control?	Define and describe the methods of working: Fabrication being carried out in a logical sequence. LEV booths large enough for largest workpieces. Workpiece or jig can be moved to avoid welder standing between the fume and the extraction.	
7	How do the controls integrate into an effective set of measures?	In most workplaces, control of fume requires general ventilation and LEV. RPE is needed for high fume or high hazard components. Constant need to move LEV trunking. Need time, training and encouragement to adapt to on-gun extraction. May not be suitable for all jobs.	
	Each of use, maintenance and repair		
8a	Is the control measure easy to use?	Does not require adjustment. LEV trunking in confined and restricted spaces.	
8b	Is the control measure easy to maintain?	Having many small LEV systems and large numbers of RPE sets will create a burden.	
8c	Is the control measure easy to repair?	Flexible trunking is easily damaged by heat and sparks.	

Note: There is a hierarchy of control reliability often linked to effectiveness. Address the most significant sources first – see Principle A

Principle (e)	Where adequate control of exposure cannot be achieved by other means, provide, in combination with other control measures, suitable personal protective equipment (PPE) including respiratory protective equipment (RPE)	

Note: If needed, as an element in a set of control measures, PPE usage must be managed within a programme

	Guidance points and checklist	Responses and action notes	Action
1a	Is PPE required, in addition to other control options?		
1b	List type(s) of RPE and the degree of protection required	In most situations, FFP1 will be sufficient, although there are difficulties with compatibility with welding faceshields	
1c	List type(s) of other PPE and the performance required	Eye protection and safety protection will also be needed	
2	Is PPE currently provided adequate to deal with the hazard?		
3	Is all PPE suitable for the wearer and work environment?	Specific RPE for welders is available, usually as a part of the welders' visor. Vision – Welding faceshields/RPE causes severe restriction. Moving outside the immediate work area should be with visor raised. Loss of communication is not often a factor in welding	
4a	Does RPE fit properly? Has fit-testing been done?		
4b	Does other PPE fit?		
5	Do wearers find it reasonably comfortable over the whole exposure period?		
6	Have supervisors and wearers been trained to use RPE and PPE		
7	Are the storage arrangements adequate?	Where is the RPE left during breaks? Is there a storage cupboard or similar?	
8a	Is the PPE checked? Are the checks frequent enough?	Include before-use checks and frequency of filter changes	
8b	Who does the checking?		
8c	Date of next check?		
9a	What are the arrangements for thorough examination and test of RPE another PPE?		
9b	Who does this examination and test?		
9c	Where are the records kept?		

Principle (f)	**Check and review regularly all elements of control measures for their continuing effectiveness**	

Note I	*If you understand the characteristics and effectiveness of the control measures, focus on checking and maintaining them.*	
Note II	*If the characteristics and effectiveness of the control measures are unclear, check that exposure is adequately controlled.*	
Note III	*The frequency and thoroughness of checking should relate to the likelihood that a control will break down, and the consequences for health if it does break down.*	

	Guidance points and checklist	**Responses and action notes**	**Action**
	List all the elements in your set of control measures in (rough) order of importance:		
1a	'Hardware controls' such as process equipment, applied controls such as extraction, and PPE	Enclosure, LEV, General ventilation, RPE	
1b	'Software controls' such as instructions on methods of working, supervision and health surveillance	Fabrication sequence. Avoidance of enclosed and confined spaces. Correct use of all hardware	
2	Are you confident that the control measures will effectively, reliably and adequately control exposure?		
3a	How do you detect significant change? List the checks.	Hardware: LEV on and capturing fume. RPE clean and in good repair. Software: Surface contaminants removed. Welder avoids putting head in fume. LEV adjusted correctly. RPE worn correctly and filters changed regularly	
3b	How often should the checks be made?		
3c	Is there a programme of regular checks?	Weekly LEV flow rates or static pressure tests. 14 monthly LEV statutory examination and test. Pre- and post-use checks of RPE for damage. Observe process for escape of fume*. Observe capture of fume by LEV*. Observe removal of fume from workplace*. *= dust lamp may be used. Air-sampling for individual toxic metals may be necessary for high-alloy steels	
3d	What records are kept?		
4a	What basic checks will be done each day?	Welding settings – welder. LEV on – user. RPE clean and undamaged – wearer. LEV correctly used and adjusted – supervisor. RPE worn and used correctly – supervisor.	
4b	Who does these checks?	Welding settings – welder. LEV on- user. RPE clean and undamaged – wearer. LEV correctly used and adjusted – supervisor. RPE worn and used correctly – supervisor.	
4c	What records are kept?		
5a	Do <u>qualitative</u> checks show adequate control?		
5b	Do <u>quantitative</u> checks show adequate control?		
5c	Do you use the results of checks to change what checks you make or how often you make them?		

Qualitative tests – e.g. observation, settled dust, odour, dust lamp, smoke tests, dye tracking

Quantitative tests – e.g. air sampling, biological monitoring, surface or skin wipes, air speed measurements, process criteria

Principle (g)	Inform, train all employees on the hazards and risks from hazardous substances, and how to use the control measures to minimise those risks		
	Note: People need knowledge and understanding to motivate action, and confidence that measures work to assure their use		
	Guidance points and checklist	**Responses and action notes**	**Action**
	Training and instruction on health risks		
1a	Is this clear, concise, accessible and interesting?	Diseases – Progressive long-term decrease in lung function and possible COPD. Asthma from metal such as chromium and nickel, or irritating gases such as ozone and Nox. Lung cancer, especially from recognised carcinogens such as nickel and chromium. Causes – Inhaling welding fume. Outcomes – Severe debility because of breathing difficulties. Possible need to leave the welding industry. Instruction is delivered by: It is reinforced by:	
1b	How do you check that trainees understand what they are being told?		
	Training and instruction on how control measures work.		
2a	Is this clear, concise, accessible and interesting?	How they protect – Respirators will not protect against oxygen loss. How to use them correctly. Checks to be carried out and how to get repairs done. Training is delivered by: It is reinforced by: Refresher training is carried out	
2b	How do you check that trainees understand what they are being told?		
2c	How do you check that they put the training into practice?		
3a	Are the control measures designed so that workers can use them easily?		
3b	Were workers on the process involved in developing the control measures?		
3c	Do they have confidence in the control measures?		
3d	Do they continue to use the control measures properly?		

Note: *Where control measures involve methods of working or affect the organisation of work, involve workers to make sure the proposed measures are workable*

Principle (h)	Ensure that the introduction of measures to control exposure does not increase the overall risk to health and safety		
	Guidance points and checklist	**Responses and action notes**	
	How could the application of new control measures affect other risk elements:		
1a	What risks to health?	There are no additional MSD risks	
1b	How to minimise these risks?	Planning of large fabrications. Welding posture is acceptable	
2a	What risks to safety?	Explosion risks have been considered.	
2b	How to minimise these risks?	Oxygen and flammable gases in workplace. Cylinders should not be in confined spaces. Access for all tasks is without risk. Planning of large fabrications.	
3a	What risks to the environment?	Releases to the environment have been considered	
3b	How to minimise these risks?	High quantities of dust containing toxic metals	