



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

**Overview of national occupational exposure
limits for substances without a European
occupational exposure limit**

**This report contains an addendum
d.d. 21-06-2023 on page 50**

RIVM letter report 2022-0123
W. Tijssen-Caan | M.J. Visser



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Colophon

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W. Tijssen-Caan (author), RIVM
M.J. Visser (author), RIVM

Contact:
Wendy Tijssen-Caan
Centre for Safety of Substances and Products
wendy.tijssen@rivm.nl

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Synopsis

Overview of national occupational exposure limits for substances without a European occupational exposure limit

Employers have to ensure a safe and healthy workplace for employees working with hazardous substances. This means that contact with chemicals should be minimised. For this purpose, it is necessary to determine the maximum concentration of a chemical in the air at the workplace that can still be considered safe. In The Netherlands, employers have to establish these so-called occupational exposure limits.

The government establishes occupational exposure limits for some substances, for example carcinogens. These national occupational exposure limits only apply to The Netherlands. For the safety of employees and to ensure harmonised legislation, it is important that European occupational exposure limits are set. In that way, employers of all Member States of the European Union have to comply with the same standard for that particular substance.

For many substances without European occupational exposure limits, national occupational exposure limits have been set. The methods for setting occupational exposure limits may vary between countries, so several different occupational exposure limits for a single substance may exist within Europe. The question is, for which substances should a European occupational exposure limit be set first. It is useful to use national occupational exposure limits for this 'prioritising process'. The research that has been performed for these substances provides information that can be used at the European level.

RIVM has made an overview of national occupational exposure limits for substances without a European occupational exposure limit. Around 1400 substances have been included in this list. The data have been collected from ten Member States that set occupational exposure limits based on the health effects of the substance (health-based occupational exposure limits). These countries are: Austria, Denmark, Finland, France, Germany, Ireland, Poland, Spain, Sweden and the Netherlands.

The overview was made at the request of the Ministry of Social Affairs and Employment. In a follow-up assignment, RIVM will advise for which of these substances a European occupational exposure limit should be set first.

Keywords: occupational exposure limits, health-based, workplace, Europe

Publiekssamenvatting

Overzicht van nationale grenswaarden voor stoffen die nog geen Europese grenswaarde hebben

Werkgevers moeten ervoor zorgen dat werknemers die met gevaarlijke stoffen werken, veilig en gezond kunnen werken. Dat betekent dat zij zo min mogelijk met gevaarlijke stoffen in contact mogen komen. Daarom moet duidelijk zijn aan welke hoeveelheid van een stof in de lucht werknemers maximaal mogen blootstaan. In Nederland moet de werkgever deze zogeheten grenswaarde voor veel stoffen bepalen.

Voor sommige stoffen, bijvoorbeeld kankerverwekkende, doet de overheid dat. Deze nationale grenswaarden gelden dan alleen voor Nederland. Voor de veiligheid van de werknemer en eenduidigheid in de regels zijn Europese grenswaarden belangrijk. Die zorgen ervoor dat werkgevers in alle landen van de Europese Unie aan dezelfde norm voor die stof moeten voldoen.

Voor veel stoffen bestaan wel nationale grenswaarden maar nog geen Europese. De manier waarop de nationale grenswaarden zijn bepaald, kan per land verschillen. Daardoor kunnen er voor één stof verschillende waarden bestaan. De vraag is nu voor welke stoffen als eerste Europese grenswaarden moeten worden bepaald. Het is handig om voor deze 'prioritering' en voor de hoogte van de Europese grenswaarde, nationale grenswaarden te gebruiken. Het onderzoek dat daarvoor is gedaan levert namelijk informatie op die op Europees niveau kan worden gebruikt.

Het RIVM heeft daarom een overzicht gemaakt van nationale grenswaarden van stoffen die nog geen Europese grenswaarde hebben. Op deze lijst staan ongeveer 1400 stoffen. De data zijn verzameld uit tien lidstaten die grenswaarden bepalen op basis van gezondheidseffecten van een stof (gezondheidskundige grenswaarden). Deze landen zijn: Oostenrijk, Denemarken, Finland, Frankrijk, Duitsland, Ierland, Polen, Spanje, Zweden en Nederland.

Het overzicht is in opdracht van het ministerie van Sociale Zaken en Werkgelegenheid (SZW) gemaakt. Het RIVM gaat op basis van deze lijst in een vervolgonderzoek adviseren voor welke stoffen als eerste Europese grenswaarden moeten worden bepaald.

Kernwoorden: grenswaarde voor de werkplek, gezondheidkundig, werkplek, Europa

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Summary

This report provides an overview of ca. 1400 substances for which legal national health-based occupational exposure limits (OELs) have been set in one or more European Member States (EU) and for which no harmonised OEL has been set or is planned to be set at European level (EU OELs) (status May 2022).

This overview facilitates prioritising of substances for setting EU OELs and finding data for establishing the EU OEL. RIVM will advise on prioritising substances for EU OEL setting based on this overview in a follow-up assignment.

Information was obtained from the Gestis International Limit Value database¹ (status May 2022). The data were kindly provided by the Institute for Occupational Safety and Health (IFA²) of the German Social Accident Insurance (DGUV)². OELs were collected from European Member States that are known to set health-based OELs. These Member States are: Austria, Denmark, Finland, France, Germany, Ireland, Poland, Spain, Sweden and The Netherlands. The final database only contains substances for which no EU OEL has been set or planned to be set.

The overview can be found in an external appendix. Substances that were recommended by the European Advisory Committee on Safety and Health at Work (ACSH)³ for setting of an EU OEL have been marked in this appendix. These substances and the corresponding national OELs are singled out in section 2.2 of this report.

Keywords: occupational exposure limits, health-based, workplace, Europe

¹ [GESTIS International Limit Values \(dguv.de\)](https://www.dguv.de/gestis/)

² IFA: Institut für Arbeitsschutz ; DGUV: Deutsche Gesetzliche Unfallversicherung

³ [Opinion on priority chemicals for new or revised occupational exposure limit values under EU OSH legislation Doc. 006-21 - Adopted on 26/05/2021](#)

1 Introduction

This report provides an overview of substances with national health-based Occupational Exposure Limits (OELs) in one or more of ten selected European Member States and for which no European OEL (EU OEL) has been established or is planned to be set (status: May 2022). This overview was prepared on request of the Dutch Ministry of Social Affairs and Employment.

The goal of the overview is to prioritise substances for establishment of EU OELs and finding data for setting of the EU OELs. The list is also useful for choosing substances for setting national OELs, as part of national OEL work programmes, such as the work programme of the Dutch Health Council. The research that has been performed for these substances for establishment of national OELs provides information that can be used at the European level.

1.1 Occupational Exposure Limits

An OEL is the maximum allowed concentration of a given substance in the air at the workplace (in parts per million (ppm) and/or micrograms per cubic meter (mg/m³)). OELs can be set as time-weighted average (TWA) for an 8 hour period (TWA 8h), a period of 15 minutes (short-term exposure limit: 15-min STEL) or as a Ceiling limit value.

In The Netherlands employers are primarily responsible for setting OELs. Additionally, the Dutch government establishes OELs for:

- Substances with an EU OEL.
- Substances without an EU OEL, but exclusively:
 - Substances that are not produced but are by-products of processes (substances without an 'owner').
 - Substances that require special attention because of serious health concerns, such as carcinogens, mutagens, reprotoxic substances and allergens.

EU OELs are established by the European Commission following several steps according to the *Chemical Agents Directive 98/24/EC (CAD)* and the *Carcinogens, Mutagens or Reprotoxic substances at work Directive 2004/37/EC (CMRD)*⁴.

The Advisory Committee on Safety and Health at Work (ACSH) assists the European Commission in the preparation, implementation and evaluation of activities in the field of occupational safety and health and facilitates cooperation between national administrations, trade unions and employers' organisations. One of the tasks of ACSH is advising the European Commission on substances for which setting of an EU OEL is recommended. In this prioritising process, ACSH is supported by the Working Party on Chemicals (WPC).

⁴ [CAD and CMD legislation - ECHA \(europa.eu\)](https://echa.europa.eu)

When substances are selected for setting of an EU OEL they are included in the working programme of the Risk Assessment Committee (RAC) of the European Chemicals Agency (ECHA). RAC provides a scientific opinion on health-based OELs.

There are two types of EU OELs:

- Binding OELs (BOELs) under the CMRD or CAD
- Indicative OELs (IOELs) under the CAD

BOELs can be set for substances for which no safe level exists (for example carcinogenic substances with a direct genotoxic working mechanism) or substances for which a safe level does exist but which have strong socio-economic interest or important technical feasibility constraints. For BOELs the scientific opinion of RAC is followed by feasibility studies by the WPC and ACSH. Also socio-economic factors are evaluated. BOELs do not necessarily represent a safe level, but provide a minimum level of protection. Member States are obliged to implement national OELs equal to or lower than the BOEL.

Indicative OELs represent a safe level below which no health effects should occur. The scientific opinion of RAC is not followed by feasibility studies or consideration of socio-economic factors. Member States should take this value into account when establishing a national OEL. Deviation from the indicative OEL is allowed, provided that the foundation of the OEL is scientifically based.

Only part of the EU OEL process is described here, to introduce the roles of the WPC, ACSH and RAC in this process. The EU OEL process is described in more detail on the [ECHA website](#).

On a national level OELs for substances are set according to national legislation. The methods for deriving national OELs may differ between countries⁵, which may result in a variety of national OELs for an individual substance within Europe.

1.2 Substances recommended by ACSH for setting of an EU OEL

ACSH published an opinion on substances recommended for setting of an EU OEL in May 2021.⁶ This opinion also includes a list of substances with current BOELs that are recommended for re-evaluation.

These ACSH lists of prioritised substances have been used in this report, as will be explained in section 1.3.

The substantiation for prioritizing of substances by ACSH is not included in this report. Background information can be found in the ACSH opinion.

⁵ [OECD report: Establishing Occupational Exposure Limits Series on Testing and Assessment No. 351](#)

⁶ [ACSH report: opinion on priority chemicals for new or revised occupational exposure limit values under EU OSH legislation Doc. 006-21 - Adopted on 26/05/2021](#)

1.3 Method

This report includes national OELs from ten European Member States that are known to establish health-based OELs⁷. These Member States are: Austria, Denmark, Finland, France, Germany⁸, Ireland, Poland, Spain, Sweden and The Netherlands.

The source used for collecting national OELs was the Gestis International Limit Value database⁹ (status May 2022). The data were kindly provided by the German Institute for Occupational Safety and Health (IFA¹⁰) of the Social Accident Insurance (DGUV¹⁰).

The list of substances was subsequently filtered to only show substances that meet the following conditions:

Substances with a national OEL in one or more of the selected Member States:

- For which no EU OEL (IOEL or BOEL) has been established.
- For which there are no previous¹¹ or current consultations¹² on EU OEL recommendation by RAC.

The total list of substances that meet the above conditions is published in an external appendix (see the link in section 2).

The substances on the total list were compared to the substances recommended by ACSH in May 2021⁶ for setting of an EU OEL. Substances from this ACSH list with one or more national OEL were selected. These substances and the corresponding OELs are singled out in section 2.1.

Finally, any national OELs of substances that were recommended by ACSH for BOEL re-evaluation were looked up. Substances from this list with one or more national OEL were selected. These substances and the corresponding OELs are singled out in section 2.2.

⁷ More European Member States than the ones mentioned here establish health-based OELs. In consultation with the Ministry of Social Affairs and Employment, it was decided to start with the OELs from these ten Member States.

⁸ Only OELs from the Committee on Hazardous Substances (Ausschuss für Gefahrstoffe -AGS) were provided. MAK values (OELs) from the DFG Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area ("MAK Commission"- Deutsche Forschungsgemeinschaft – DFG) could not be provided for copyright reasons.

⁹ [GESTIS International Limit Values \(dguv.de\)](https://www.dguv.de/gestis/)

¹⁰ IFA: Institut für Arbeitsschutz ; DGUV: Deutsche Gesetzliche Unfallversicherung

¹¹ [Occupational exposure limits – Previous consultations on OEL recommendation - ECHA \(europa.eu\)](https://echa.europa.eu/en/occupational-exposure-limits)

¹² [Occupational exposure limits substance evaluations - ECHA \(europa.eu\)](https://echa.europa.eu/en/occupational-exposure-limits-substance-evaluations);

2 Overview of substances

The total list of substances with national OELs in the selected Member States for which no EU OEL has been set or is planned to be set (status May 2022) can be found in [an external appendix](#) (Excel format).

Table 1 in section 2.1 shows the substances recommended by ACSH for EU OEL setting for which one or more national OEL has been established. The corresponding OELs are shown in tables 2-4.

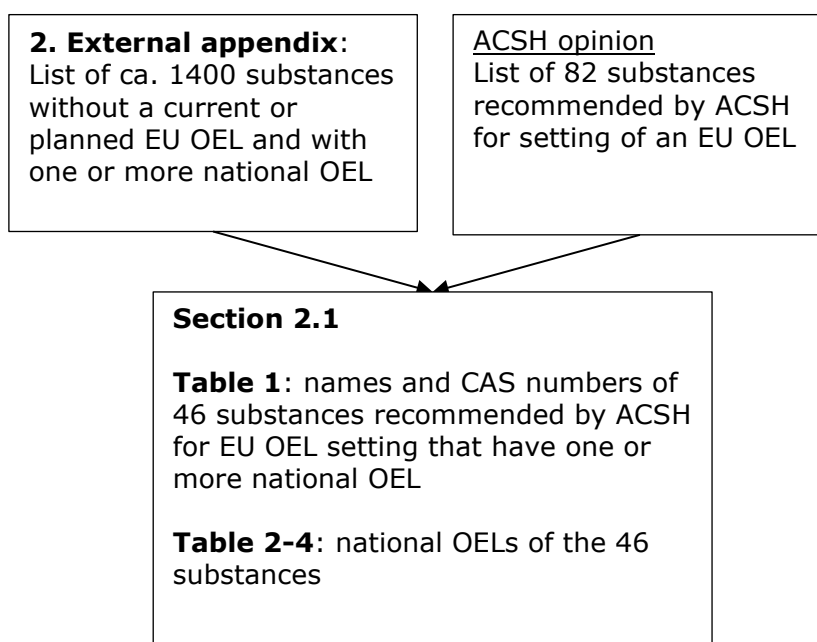


Figure 1 explanation of the lists shown in sections 2 and 2.1

Table 5 in section 2.2 shows the substances that have been recommended by ASCH for BOEL re-evaluation for which one or more national OEL has been established. The corresponding OELs are shown in table 6.

2.1 Overview of national OELs of substances recommended by ACSH for setting of an EU OEL

Table 1 shows substances and substance groups with the corresponding CAS numbers that were recommended by ACSH for the RAC EU OEL working programme. The substance names link to the corresponding national OELs in tables 2-4.

This list of national OELs can be used as a starting point for selecting substances for setting of EU OELs.

ACSH distinguishes the following priorities:

- Prioritised under the CAD for setting of an EU OEL.
- Prioritised under the CMRD for setting of an EU OEL (immediate priority and next level priority).

These priorities are marked in the table by an 'x' in the corresponding column.

Table 1 substances recommended by ACSH for setting of an EU OEL with one or more national OEL

Substance (group) name	CAS nr	CAD	CMRD immediate	CMRD next level
1,2-dihydroxybenzene (Pyrocatechol)	120-80-9			x
2-Butanone oxime	96-29-7			x
Azodicarbonamide	123-77-3	x		
Benzyl chloride	100-44-7			x
Borates, tetra, sodium salts, anhydrous, Sodiumtetraborate	1303-43-4	x		
Boric acid and sodium borate	10043-35-3	x		
Boron oxide	1303-86-2	x		
Butan-1-ol	71-36-3	x		
Cobalt and its compounds	7440-48-4		x	
Cobalt carbonyl	10210-68-1		x	
Cobalt hydrocarbonyl	16842-03-8		x	
Cobalt naphthenate	61789-51-3		x	
Copper and its compounds, inorganic	7440-50-8	x		
Diethyl phthalate	84-66-2	x		
Dimethyl phthalate	131-11-3	x		
Ethylene imine (Aziridine)	151-56-4			x
Fibres, man made vitreous (amorphous) fibres		x		
Fibrous dust, man-made mineral (if carcinogenic)		x		
Hydrogen peroxide	7722-84-1	x		

Substance (group) name	CAS nr	CAD	CMRD immediate	CMRD next level
Hydrogen peroxide, aqueous solution		x		
Mineral fibres		x		
Naphthalene	91-20-3	x		
Platinum compounds, soluble		x		
Platinum metal	4-6-7440	x		
Platinum, soluble salts		x		
Silicon carbide (not whiskers)	409-21-2			x
Silicon carbide fibres (incl. whiskers), respirable fraction	409-21-2			x
Styrene	100-42-5	x		
Tin compounds, inorganic	7440-31-5	x		
Tin compounds, inorganic, except oxides	7440-31-5	x		
Tin compounds, inorganic, except SnH₄	7440-31-5	x		
Tin compounds, organic	7440-31-5	x		
Tin compounds, organic, except Cyhexatin (ISO)		x		
Tin oxide	1332-29-2	x		
Tin(II) chloride	7772-99-8	x		
Tin(II) compounds, inorganic		x		
Tin(II) fluoride	7783-47-3	x		
Tin(II) methanesulfonate	53408-94-9	x		
Tin(IV) compounds, inorganic		x		
Tin(IV) oxide	18282-10-5	x		
Tin, metal	7440-31-5	x		
Tin, tri-n-butyl tin compounds	56-35-9	x		
Titanium dioxide	13463-67-7	x		
Zinc oxide	1314-13-2	x		
Zinc oxide, dust	1314-13-2	x		
Zinc oxide, fume or respirable dust	1314-13-2	x		

Table 2 National OELs of substances recommended by ACSH for setting of an EU OEL (under the CAD)

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
Azodicarbonamide	123-77-3								
		Finland		0.5					
		Ireland		1		3			Sens.
Borates, tetra, sodium salts, anhydrous, Sodiumtetraborate	1303-43-4								
		Finland		0.5					As Boron (B)
		Ireland		1					As B
Boric acid and sodium borate	10043-35-3								
		Germany (AGS)		0.5		1			As B Inhalable fraction
		Spain	OEL	2		6			As B
		Ireland		2					As B
Boron oxide	1303-86-2								
		Denmark		10		20			As B
		Spain		10					As B
		France		10					As B
		Ireland		10				As B	

¹³ Parts per million (ppm)¹⁴ Time-weighted average (TWA) for an 8 hour period (TWA 8h)¹⁵ Time-weighted average (TWA) for a period of 15 minutes (short-term exposure limit: 15-min STEL or 15 minutes average value or 15 minutes reference period)

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Poland		10					As B
Butan-1-ol	71-36-3								
		Austria	50	150	200	600			
		Germany (AGS)	100	310	100	310			
		Denmark	50	150			50	150	Skin
		Spain	20	61	50	154			
		France			50	150			
		Finland	50	150	75	230			
		Ireland	20						
		Poland		50		150			
		Sweden	15	45	30	90			
Copper and its compounds, inorganic	7440-50-8								
		Austria		1		4			Inhalable fraction
		Spain		0.1					Respirable fraction
		Poland		0.2					Inhalable fraction As Cu
		Sweden		0.01					Respirable fraction
		The Netherlands		0.1					
Diethyl phthalate	84-66-2								
		Austria		3		5			
		Denmark		3		6			
		Spain		5					

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		France		5					
		Finland		5		10			
		Ireland		5		10			
		Poland		5					Inhalable fraction
		Sweden		3		5			
Dimethyl phthalate	131-11-3								
		Denmark		3		6			
		Spain		5					
		France		5					
		Finland		5		10			
		Ireland		5		10			
		Poland		5					
		Sweden		3		5			
Fibres, man made vitreous (amorphous) fibres									
		Sweden		0.2 fibres per cm ³					Refractory ceramic fibres
				0.2 fibres per cm ³					Special purpose fibres
				1 fibre per cm ³					Other fibres
Fibrous dust, man-made mineral (if carcinogenic)									

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Austria		0.5 fibres per cm ³		2 fibres per cm ³			TRK value (Technical Guidance Concentration, based on technical feasibility)
Hydrogen peroxide	7722-84-1								
		Austria	1	1.4	2	2.8			
		Denmark	1	1.4	2	2.8			
		Germany (AGS)	0.5	0.71	0.5	0.71			
		Spain	1	1.4					
		France	1	1.5					
		Finland	1	1.4	3	4.2			
		Ireland	1	1.5	2	3			
		Poland		0.4		0.8			
		Sweden	1	1.4	2	3			
Hydrogen peroxide, aqueous solution									
		Finland	1	1.4	3	4.2			
Mineral fibres									
		Finland		1 fibres per cm ³					
		Poland						1 fibres per cm ³	
Naphthalene	91-20-3								
		Austria	10	50					

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Germany (AGS)	0.4	2 (1)	1.6	8			Inhalable fraction and vapour Skin (1) For the abrasives industry, an AGW of 5 mg/m ³ applies until 28 February 2023 according to the registered use according to the EU REACH Regulation.
		Denmark	10	50	20	100			
		Spain	10	53	15	80			Skin
		France	10	50					
		Finland	1	5	2	10			
		Ireland	10	50					
		Poland		20		50			
		Sweden	10	50	15	80			
		The Netherlands		50		80			
Nickel, matte roasting									
		France		1					as Ni
Nickel, metal	7440-02-0								

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Germany (AGS)		0.006		0.048			An assessment based on the AGW for nickel metal can be made if only nickel metal is present. Respirable fraction
		Finland		0.01					Calculated as Ni Respirable fraction
Nickel, metal and compounds	7440-02-0								
		Germany (AGS)		0.03		0.24			As Ni Inhalable fraction
Nickel, metal, total dust	7440-02-0								
		Austria		0.5		2			
		Denmark		0.05		0.1			
		Spain		1					Sen
		France		1					
		Ireland		0.5					
Platinum compounds, soluble									
		Austria		0.002					As Pt Inhalable aerosol
		Denmark		0.002		0.004			as Pt

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Ireland		0.002					as Pt
		Sweden		0.002					as Pt
Platinum metal	7440-06-4								
		Austria		1					Inhalable aerosol
		Germany (AGS)		1					Inhalable aerosol
		Denmark		1		2			
		Spain		1					
		France		1					
		Finland		1					
		Ireland		1					
		Poland		1					
		Sweden		1					
		The Netherlands		1					
Platinum, soluble salts									
		Finland		0.002					Calculated as Pt
		Sweden		0.5					
Styrene	100-42-5								
		Austria	20	85	80	340			
		Germany (AGS)	20	86	40	172			
		Denmark	25	105	25	105			
		Spain	20	86	40	172			
		France	23.3	100	46.6	200			Restrictive statutory limit values Skin

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Finland	20	86	100	430			
		Ireland	20	85	40	170			
		Poland		50		200			
		Sweden	10	43	20	86			
Tin, metal	7440-31-5								
		Spain		2					
		Finland		2					
		Ireland		2					
Tin compounds, inorganic	7440-31-5								
		Sweden		2					
		The Netherlands		2					As Sn
Tin compounds, inorganic, except oxides	7440-31-5								
		Sweden		2					As Sn
Tin compounds, inorganic, except SnH ₄	7440-31-5								
		Austria		2		4			Inhalable aerosol
		Denmark		0.1		0.2			Skin
		Spain		2					
		Ireland		2					
		Poland		2					
Tin compounds,	7440-31-5								

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
organic									
		Spain		0.1		0.2			As Snskin
		Finland		0.1		0.3			As Sn
		Ireland		0.1		0.2			As Sn
		Sweden		0.1		0.2			As Sn
Tin compounds, organic, except Cyhexatin (ISO)									
		Austria		0.1		0.2			As Sn inhalable aerosol
		Denmark		0.1		0.2			As Sn
		Spain		0.1		0.2			As Sn
		France		0.1		0.2			As Sn
		Sweden		0.1		0.2			As Sn
Tin oxide	1332-29-2								
		Finland		2					As Sn
Tin(II) chloride	7772-99-8								
		Finland		2					As Tin (Sn)
Tin(II) compounds, inorganic									
		Germany (AGS)		8					Inhalable aerosol
Tin(II) fluoride	7783-47-3								
		Finland		2					As Sn
Tin(II)	53408-94-9								

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
methanesulfonate									
		Finland		2					As Sn
Tin(IV) compounds, inorganic									
		Germany (AGS)		2					Inhalable aerosol
Tin(IV) oxide	18282-10-5								
		Finland		2					As Sn
Tin, tri-n-butyl tin compounds	56-35-9								
		Austria	0.002	0.05	0.008	0.2			
		Germany (AGS)	0.0018	0.009	0.0018	0.009			As Sn Inhalable fraction and vapour
		Denmark	0.002	0.05	0.004	0.1			
Titanium dioxide	13463-67-7								
		Denmark		6		12			Total dust
		Spain		10					Inhalable fraction
		France		11					Inhalable aerosol
		Ireland		10					Inhalable fraction
		Ireland		4					Respirable fraction
		Poland		10					Inhalable fraction
		Sweden		5					Inhalable aerosol
Zinc oxide	1314-13-2								

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹³) ¹⁴	TWA-8h (mg/m ³)	15-min STEL (ppm) ¹⁵	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Finland		2		10			
Zinc oxide, dust	1314-13-2								
		Spain		10					
		France		10					
		Sweden		5					
Zinc oxide, fume or respirable dust	1314-13-2								
		Austria		5					Respirable aerosol
		Denmark		4		8			
		Spain		2		10			
		France		5					
		Ireland		2		10			
		Poland		5		10			

Table 3 National OELs of substances recommended by ACSH for setting of an EU OEL (CMRD: priority immediate)

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹⁶) ¹⁷	TWA-8h (mg/m ³)	15-min STEL ¹⁸ (ppm)	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
Cobalt and its compounds	7440-48-4								
		Austria		0.1		0.4			As Cobalt (Co) TRK value (based on technical feasibility)
		Germany (AGS)		0.005		0.04			As Co Classified as C1A and C1B Respirable fraction Workplace exposure concentration corresponding to the proposed tolerable cancer risk. (see background document: Germany AGS)
		Germany (AGS)		0.0005					As Co Classified as C1A and C1B Respirable fraction Workplace exposure

¹⁶ Parts per million (ppm)¹⁷ Time-weighted average (TWA) for an 8 hour period (TWA 8h)¹⁸ Time-weighted average (TWA) for a period of 15 minutes (short-term exposure limit: 15-min STEL or 15 minutes average value or 15 minutes reference period)

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹⁶) ¹⁷	TWA-8h (mg/m ³)	15-min STEL ¹⁸ (ppm)	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
									concentration corresponding to the proposed preliminary acceptable cancer risk. (see background document: Germany AGS)
		Denmark		0.01		0.02			As Co
		Spain		0.02					As Co
		Finland		0.02					As Co
		Ireland		0.02					As Co
		Poland		0.02					As Co
		Sweden		0.02					As Co and inorganic compounds
		The Netherlands		0.02					Dust and fume, As Co
Cobalt carbonyl	10210-68-1								
		Austria		0.1		0.4			TRK value (based on technical feasibility) inhalable aerosol
		Denmark		0.1		0.2			
		Spain		0.1					
		France		0.1					
		Ireland		0.1					
Cobalt hydrocarbonyl	16842-03-8								

Substance (group) name	CAS nr	Member State	TWA-8h (ppm¹⁶)¹⁷	TWA-8h (mg/m³)	15-min STEL¹⁸ (ppm)	15-min STEL (mg/m³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m³)	Remarks
		Denmark		0.1		0.2			
		Spain		0.1					
		France		0.1					
		The Netherlands		0.1					
Cobalt naphthenate	61789-51-3								
		Finland		0.02					As Co

Table 4 National OELs of substances recommended by ACSH for setting of an EU OEL (CMRD: priority next level)

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹⁹) ²⁰	TWA-8h (mg/m ³)	15-min STEL ²¹ (ppm)	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
Benzyl chloride	100-44-7								
		Austria		0.2			0.8		TRK value (based on technical feasibility)
		Denmark	1	5			1	5	
		Spain	1	5.3					
		France	1	5	2	11			
		Finland	0.5	2.6			1.5	7.9	
		Ireland	1						
		Poland		3				9	
		Sweden	1	5	2	11			
2-Butanone oxime	96-29-7								
		Germany (AGS)	0.3	1	2.4	8			Skin
		Denmark	25						Provisional
		Ireland	3	10	10	33			
1,2-dihydroxybenzene (Pyrocatechol)	120-80-9								
		Austria	4.5	20 (1)	9	40 (1)			(1) Inhalable aerosol

¹⁹ Parts per million (ppm)²⁰ Time-weighted average (TWA) for an 8 hour period (TWA 8h)²¹ Time-weighted average (TWA) for a period of 15 minutes (short-term exposure limit: 15-min STEL or 15 minutes average value or 15 minutes reference period)

Substance (group) name	CAS nr	Member State	TWA-8h (ppm ¹⁹) ²⁰	TWA-8h (mg/m ³)	15-min STEL ²¹ (ppm)	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Denmark	5	20	10	40			
		Spain	5	23					skin
		France	5	20					
		Finland	5	22	10	45			
		Sweden	5	20	10	40			
Ethylene imine (Aziridine)	151-56-4								
		Austria	0.5	0.9	2	3.6			TRK value (based on technical feasibility)
		Denmark	0.5	1	1	2			Skin
		Spain	0.2	0.36					Skin
		Finland			0.5	0.89			
		Ireland	0.05	0.1					
		Poland		0.62					
		The Netherlands		0.0009					
Silicon carbide fibres (incl. whiskers), respirable fraction	409-21-2								
		Ireland		4					
Silicon carbide (not whiskers)	409-21-2								
		Austria		4					Respirable aerosol

Substance (group) name	CAS nr	Member State	TWA-8h (ppm¹⁹)²⁰	TWA-8h (mg/m³)	15-min STEL²¹ (ppm)	15-min STEL (mg/m³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m³)	Remarks
		Spain		10					Inhalable aerosol
				3					Respirable aerosol
		France		10					Respirable aerosol
		Ireland		10					Inhalable fraction
		Ireland		3					Respirable fraction
		Ireland		0.1 F/cm ³					
		Poland		10					Inhalable fraction

2.2 Overview of national OELs of substances recommended by ACSH for BOEL re-evaluation

Table 5 shows substances and substance groups and the corresponding CAS numbers recommended by ACSH for re-evaluation of the current BOEL. The substance names link to the corresponding national OELs in table 6.

The data obtained for establishment of the national OELs provides information for re-evaluation of the BOEL.

Table 5 Substances recommended by ACSH for BOEL re-evaluation with one or more national OEL

Substance (group) name	CAS nr
Chromium(VI) compounds	18540-29-9
Diesel engine exhaust emissions	
Diesel exhaust, dust respirable	
Diesel fuel (vapour and aerosol), in total hydrocarbons	
1,2-Dibromoethane	106-93-4
Silica, respirable crystalline	

Table 6 National OELs of substances recommended by ACSH for BOEL re-evaluation (under the CMRD)

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
Chromium(VI) compounds	18540-29-9								
		EU (BOEL)		0.005					As Chromium (Cr) Carcinogens defined as a substance which meets the criteria for classification as a category 1 or 2 carcinogen set out in Annex VI to Directive 67/548/EEC
		EU (BOEL)		0.01					As Cr Carcinogens defined as a substance which meets the criteria for classification as a category 1 or 2 carcinogen set out in Annex VI to Directive 67/548/EEC Limit value until 17.01.25 Binding Occupational

²² Parts per million (ppm)²³ Time-weighted average (TWA) for an 8 hour period (TWA 8h)²⁴ Time-weighted average (TWA) for a period of 15 minutes (short-term exposure limit: 15-min STEL or 15 minutes average value or 15 minutes reference period)

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
									Exposure Limit Value (BOELV) ~ (for references see bibliography)
		EU (BOEL)		0.025					As Cr Carcinogens defined as a substance which meets the criteria for classification as a category 1 or 2 carcinogen set out in Annex VI to Directive 67/548/EEC Limit value for welding or plasma cutting work or similar smoke-producing work procedures until 17.01.25 Binding Occupational Exposure Limit Value (BOELV) ~ (for references see bibliography)
		Austria		0.01		0.04			As Cr TRK value (based on technical feasibility) Inhalable fraction

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Austria		0.02		0.08			As Cr TRK value (based on technical feasibility) Inhalable fraction Until 17-01-2025
		Germany (AGS)		0.001		0.008			As Cr Assessment scale, risk-based (see background document: Germany AGS) Inhalable fraction
		Spain		0.05					Insoluble compounds
				0.01					Soluble compounds
		France		0.05		0.005 (1)			As Cr (1) Restrictive statutory limit values Restrictive statutory limit values will come into force on 1 July 2014
				0.001					As Cr Restrictive statutory limit values Restrictive statutory limit

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
									values will come into force on 1 July 2014
		Finland		0.005					As Cr
		Ireland		0.005					As Cr Water soluble
		Sweden		0.005		0.015			As Cr Inhalable fraction
		The Netherlands		0.001					As Cr Applies for soluble compounds
Diesel engine exhaust emissions		EU (BOEL)		0.05					Diesel particulate matter as elemental C The limit value applies from 21.02.2023, for underground mining and tunnelling from 21.02.2026. Bold-type: Binding Occupational Exposure Limit Value (BOELV) ~ (for references see bibliography)
		Austria		0.3		1.2			Diesel particulate matter as elemental C TRK value (based on technical feasibility) respirable aerosol Underground mining

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
				0.1		0.4			Diesel particulate matter as elemental C TRK value (based on technical feasibility) respirable aerosol For the rest
		France		0.05					Diesel particulate matter as elemental C Indicative statutory limit values The limit value shall apply from 21 February 2023. For underground mining and tunnel construction the limit value shall apply from 21 February 2026.
		Germany (AGS)		0.05					Diesel particulate matter as elemental C Respirable fraction In the assessment index according to TRGS 402, the diesel soot particles (determined in the respirable dust fraction) in analogy to the General

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
									Dust Limit (see TRGS 900 point 2.4.1 (6)) and NO and NO ₂ from the exhaust gases of diesel engines not included. Not applicable to underground mining until 31 October 2022.
		Ireland		0.05					Diesel particulate matter as elemental C
		Sweden		0.05					Diesel particulate matter as elemental C The limit value shall apply from 21 February 2023. For underground mining and tunnel construction the limit value shall apply from 21 February 2026.
		The Netherlands		0.01					As respirable diesel particulate matter as elemental C
Diesel exhaust, dust respirable									
		Denmark		0.01					EC/m ³ Carcinogenic

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Ireland		0.15					Particulates < 0.1 µm
		Poland		0.5					
		The Netherlands		0.01					As respirable EC
Diesel fuel (vapour and aerosol), in total hydrocarbons		Ireland		100					In total hydrocarbons
1,2-Dibromoethane	106-93-4								
		EU (BOEL)	0.1	0.8					Substantial contribution to the total body burden via dermal exposure possible Binding Occupational Exposure Limit Value (BOELV) ~ (for references see bibliography)
		Austria	0.1	0.8	0.4	3.2			TRK value (based on technical feasibility)
		Germany (AGS)	0.1	0.8					AGW not derived health-based, derivation of an exposure-risk relationship according to TRGS 910 is initiated. Formal implementation of Directive 2019/130/EU. Skin
		Denmark	0.0002	0.002	0.2	2			Skin Carcinogenic value

Substance (group) name	CAS nr	EU (BOEL) or Member State	TWA-8h (ppm ²²) ²³	TWA-8h (mg/m ³)	15-min STEL (ppm) ²⁴	15-min STEL (mg/m ³)	Ceiling limit value (ppm)	Ceiling limit value (mg/m ³)	Remarks
		Spain	0.5	3.9					Skin
		Finland	0.1	0.78					
		Ireland	0.5	4					skin
			0.1	0.8					
		Poland		0.01					Skin
		Sweden	0.1	0.8					
		The Netherlands		0.002					Skin
Silica, respirable crystalline		EU (BOEL)		0.1					Binding Occupational Exposure Limit Value (BOELV) (for references see bibliography)
		Austria		0.15					
		Denmark		0.05		0.1			
		Finland		0.05					
		Ireland		0.1					
		The Netherlands		0.075					Respirable fraction

3 Epilogue

The overview of national OELs of substances without an EU OEL presented in this report is provided to facilitate selection of substances for setting of an EU OEL.

For example, substances with the same OEL in several Member States can be considered for establishment of an EU OEL. The research that has been performed for these substances to establish national OELs provides information that can be used at the European level.

The overview of national OELs of the substances recommended by ACSH for EU OEL setting can be used as a starting point.

In a follow-up assignment RIVM will advise on prioritizing substances for setting of an EU OEL.

4 Glossary

15 minutes average value	short-term exposure limit (15 minutes), also STEL or 15 minutes reference value
15 minutes reference value	short-term exposure limit (15 minutes), also called STEL or 15 minutes average value
ACSH	Advisory Committee on Safety and Health at Work
AGS	Ausschuss für Gefahrstoffe
BOEL	Binding Occupational Exposure Limit
BOELV	Binding Occupational Exposure Limit Value
CAD	Chemical Agents Directive 98/24/EC
CAS nr	Chemical Abstracts number
CMRD	Carcinogens, Mutagens or Reprotoxic substances at work Directive (2004/37/EC)
DFG	Deutsche Forschungsgemeinschaft
DGUV	Deutsche Gesetzliche Unfallversicherung
ECHA	European Chemicals Agency
EU OEL	Occupational exposure limit on a European level
Health-based	Based on dose-response relation
IFA	Institut für Arbeitsschutz
Inhalable fraction / dust / aerosol	Mass fraction of total airborne particles or aerosols which is inhaled through the nose and mouth
IOEL	Indicative Occupational Exposure Limit
IOELV	Indicative Occupational Exposure Limit Value
MAK	Maximum allowable concentration (Germany, Austria)
mg/m ³	micrograms per cubic meter
National OEL	Legal occupational exposure limit in one of the EU Member States
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational Exposure Limits
ppm	parts per million
RAC	Risk Assessment Committee
Respirable fraction / dust / aerosol	Mass fraction of inhaled particles and aerosols penetrating to the unciliated airways
Sen / Sens.	Sensitizing
Skin	Absorption of the agent through the skin is an important part of the total exposure
STEL 15 min.	short-term exposure limit (15 minutes), also called 15 minutes average value or 15 minutes reference value

TRK value

Technical Guidance Concentrations
(based on technical feasibility)
(Germany)

TWA 8h

time-weighted average (8 hours)

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Addendum

Supporting the prioritising process for setting EU OELs

A.1 Introduction

RIVM report 2022-0123 (further referred to as 'main report') provides an overview of national occupational exposure limits (OELs) for substances without a European OEL²⁵. It compares this overview with substances recommended for setting an EU OEL by the Advisory Committee on Safety and Health at Work (ACSH)²⁶. This comparison resulted in a list of 46 substances which were both recommended by ACSH for setting an EU OEL and which had one or more national OEL(s) available.²⁷ In the closing remarks of the main report it is stated that the RIVM will advise on prioritising substances for setting of an EU OEL. In order to support the prioritising process, this addendum provides insight into the current consensus between member states concerning the 46 previously selected substances without an EU OEL.

A.1.1 Method

In this addendum, the 46 substances identified earlier are ordered based on:

1. the number of member states with one or more existing national OEL(s) per substance;
2. the variability of these national OELs.

These criteria are based on the reasoning that a higher number of available national OELs might increase the likelihood of health-based data being available. In some cases member states might use the same data to derive their national OELs and/or use the same reasoning. This might help in reaching a consensus on the European OEL to be set. Similarly, a lower variability of national OELs might aid in reaching this consensus.

The existing list of 46 substances was selected as these both have existing national OEL(s) available and are prioritised by ACSH. The selection of member states was followed as well, as these were previously identified as setting health-based OELs (Denmark, Germany, Finland, France, Ireland, the Netherlands, Austria, Poland, Spain, and Sweden). There are probably more member states than the ones mentioned here that set health-based OELs. As this information is not readily accessible, it was decided to limit the selection to the member states identified in the main report.

A variety of national OELs were available, including 8-hour time weighted average (TWA-8h), 15-minute short time exposure limits

²⁵ RIVM Letter report 2022-0123; Overview of national occupational exposure limits for substances without a European occupational exposure limit

²⁶ [ACSH report: opinion on priority chemicals for new or revised occupational exposure limit values under EU OSH legislation Doc. 006-21 - Adopted on 26/05/2021 \(May 2021\).](#)

²⁷ Further details on the methodology can be found in sections 1.2. and 1.3 of the main report.

(STEL-15m) and ceiling limit values (CLV). There were TWA-8h OELs available for all substances, while this was not the case for STEL-15m OELs. In this addendum, only TWA-8h OELs were considered. All information was obtained from the main report, which obtained the information from the Gestis International Limit Value database (version May 2022) . At the time of writing of this addendum, this was still the most recent version available.

OELs can be based on specific inhaled airborne particle fractions (e.g. respirable, inhalable), leading to different OELs for the same substance. Unfortunately, information on the fraction to which an OEL applied was not always readily available. Therefore, no distinction could be made between, for example, respirable and inhalable OELs. Member states can also base their OEL on the OEL set by a different member state, following the health-based data already available. As the available data did not contain information on the reasoning behind an OEL, it was not possible to filter out unique (i.e. not adopted from other member states) OELs.

For each substance the lowest and highest national OEL (TWA-8h) was identified. The relative difference between the lowest and highest OELs was used as an indication for the variability. Substances were then ranked based on the number of available national OELs, followed by the relative difference between the lowest and highest OEL. Substances with identical number of national OELs and relative differences were ranked in alphabetical order. Lastly, the list was subdivided into the three priority categories identified by ACSH:

- Prioritised under the CAD for setting of an EU OEL;
- Prioritised under the CMRD for setting of an EU OEL (immediate priority and next level priority).

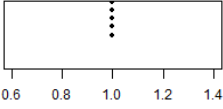
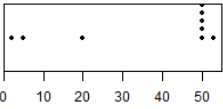
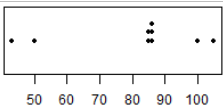
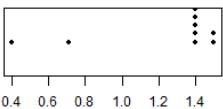
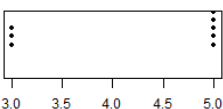
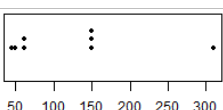
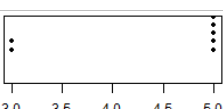
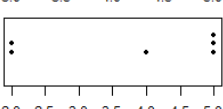
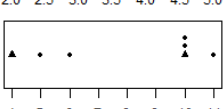
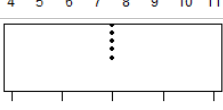
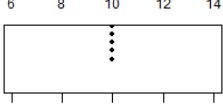
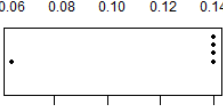
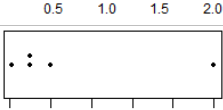
The resulting rankings are shown in section A.2.1. An overview of all included national OELs per substance per member state is shown in section A.2.2. Further observations and considerations based on these results are given in section A.3.

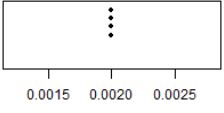
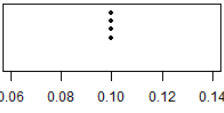
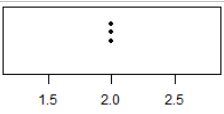
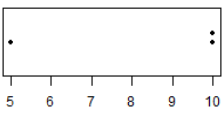
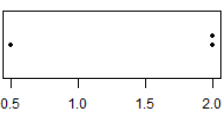
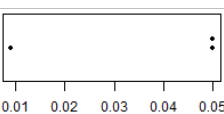
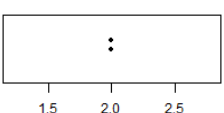
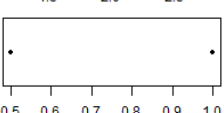
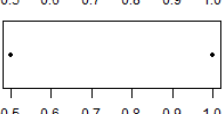
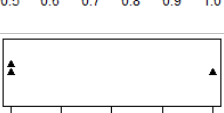
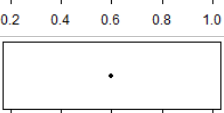
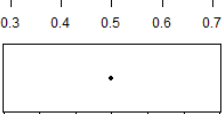
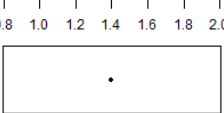
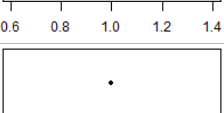
A.2 Substance ranking

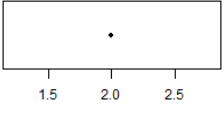
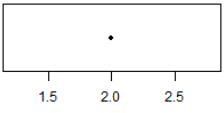
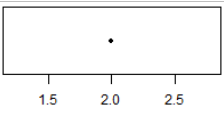
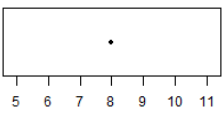
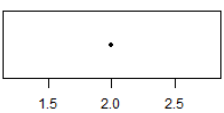
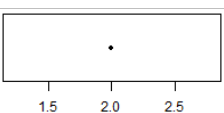
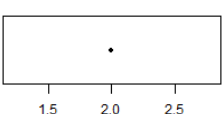
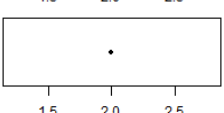
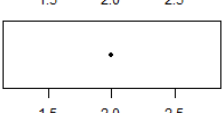
A.2.1 *Substances ranked by ACSH priority*

The following tables show substances, their CAS number (if available), the number of member states with at least one national TWA-8h OEL, the lowest and highest national TWA-8h OEL and finally a visual representation of the variability between OELs. Each dot represents a single OEL, with stacked dots representing multiple member states having the same OEL. It should be noted that due to size constraints, stacks of six dots or higher are shown as five dots. Occasionally a member state has more than one national OEL for the same substance (e.g. for specific fractions). In those cases, all OELs for a substance originating from a single member state are indicated using a different marker (triangle or square). All values are given in mg/m³ unless stated otherwise (e.g. fibres).

Table A.1 Substances prioritised under the CAD, ranked by number and relative difference between the lowest and highest OEL. Values are TWA-8h in mg/m³, unless stated otherwise.

Substance	CAS	#Member states with OEL	Lowest – highest TWA-8h OEL	Variability ^a
Platinum metal	7440-06-4	10	1 - 1	
Naphthalene	91-20-3	10	2 - 53	
Styrene	100-42-5	9	43 - 105	
Hydrogen peroxide	7722-84-1	9	0.4 - 1.5	
Diethyl phthalate	84-66-2	8	3 - 5	
Butan-1-ol	71-36-3	8	45 - 310	
Dimethyl phthalate	131-11-3	7	3 - 5	
Zinc oxide, fume or respirable dust	1314-13-2	6	2 - 5	
Titanium dioxide	13463-67-7	6	4 - 11	
Boron oxide	1303-86-2	5	10 - 10	
Tin compounds, organic, except Cyhexatin (ISO)	-	5	0.1 - 0.1	
Tin compounds, inorganic, except SnH4	7440-31-5	5	0.1 - 2	
Copper and its compounds, inorganic	7440-50-8	5	0.01 - 1	

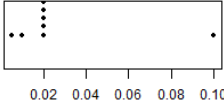
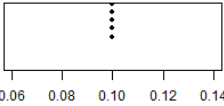
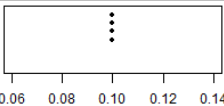
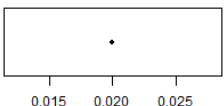
Substance	CAS	#Member states with OEL	Lowest – highest TWA-8h OEL	Variability ^a
Platinum compounds, soluble	-	4	0.002 - 0.002	
Tin compounds, organic	7440-31-5	4	0.1 - 0.1	
Tin, metal	7440-31-5	3	2 - 2	
Zinc oxide, dust	1314-13-2	3	5 - 10	
Boric acid and sodium borate	10043-35-3	3	0.5 - 2	
Tin, tri-n-butyl tin compounds	56-35-9	3	0.009 - 0.05	
Tin compounds, inorganic	7440-31-5	2	2 - 2	
Azodicarbonamide	123-77-3	2	0.5 - 1	
Borates, tetra, sodium salts, anhydrous, Sodiumtetraborate	1303-43-4	2	0.5 - 1	
Fibres, man made vitreous (amorphous) fibres ^b	-	1	0.2 - 1	
Fibrous dust, man-made mineral (if carcinogenic) ^b	-	1	0.5	
Hydrogen peroxide, aqueous solution	-	1	1.4	
Mineral fibres ^b	-	1	1	
Platinum, soluble salts	-	1	0.002	

Substance	CAS	#Member states with OEL	Lowest – highest TWA-8h OEL	Variability ^a
Tin compounds, inorganic, except oxides	7440-31-5	1	2	
Tin oxide	1332-29-2	1	2	
Tin(II) chloride	7772-99-8	1	2	
Tin(II) compounds, inorganic	-	1	8	
Tin(II) fluoride	7783-47-3	1	2	
Tin(II) methanesulfonate	53408-94-9	1	2	
Tin(IV) compounds, inorganic	-	1	2	
Tin(IV) oxide	18282-10-5	1	2	
Zinc oxide	1314-13-2	1	2	

^a The distribution of national TWA-8h OELs, each marker representing a single national OEL. When multiple OELs originate from the same member state, those OELs are identified using a different marker (triangle or square). When more than five national OELs have the same value, only five stacked markers are shown.

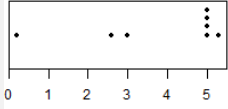
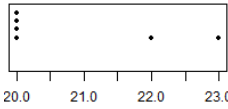
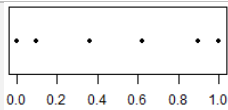
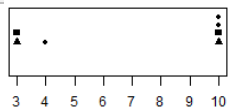
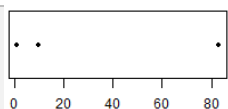
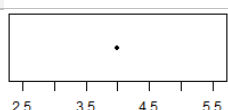
^b Fibres per cm³

Table A.2 Substances prioritised under the CMRD (immediate), ranked by number and relative difference between the lowest and highest OEL. Values are TWA-8h in mg/m³, unless stated otherwise.

Substance	CAS	#Member states with OEL	Lowest – highest TWA-8h OEL	Variability ^a
Cobalt and its compounds	7440-48-4	9	0.005 - 0.1	
Cobalt carbonyl	10210-68-1	5	0.1 - 0.1	
Cobalt hydrocarbonyl	16842-03-8	4	0.1 - 0.1	
Cobalt naphtenate	61789-51-3	1	0.02	

^a The distribution of national TWA-8h OELs, each marker representing a single national OEL. When multiple OELs originate from the same member state, those OELs are identified using a different marker (triangle or square). When more than five national OELs have the same value, only five stacked markers are shown.

Table A.3 Substances prioritised under the CMRD (next level), ranked by number and relative difference between the lowest and highest OEL. Values are TWA-8h in mg/m³, unless stated otherwise.

Substance	CAS	#Member states with OEL	Lowest – highest TWA-8h OEL	Variability ^a
Benzyl chloride	100-44-7	8	0.2 - 5.3	
Pyrocatechol	120-80-9	6	20 - 23	
Ethylene imine	151-56-4	6	0.0009 - 1	
Silicon carbide (not whiskers)	409-21-2	5	3 - 10	
2-Butanone oxime	96-29-7	3	1 - 83	
Silicon carbide fibres (incl. whiskers), respirable fraction	409-21-2	1	4	

^a The distribution of TWA-8h national OELs, each marker representing a single national OEL. When multiple OELs originate from the same member state, those OELs are identified using a different marker (triangle or square).

A.2.2 National OELs per substance per member state

Table A.4 provides an overview of all 46 substances with their available national TWA-8h OELs. All values are given in mg/m³ unless stated otherwise (e.g. fibres). Where available, information on the fraction upon which the OEL is based is given using footnotes.

Table A.4 National OELs of 46 selected substances. Values are TWA-8h in mg/m³, unless stated otherwise.

Substance	Denmark	Germany (AGS)	Finland	France	Ireland	The Netherlands	Austria	Poland	Spain	Sweden	ACSH priority
Platinum metal	1	1 ^c	1	1	1	1	1 ^c	1	1	1	CAD
Naphthalene	50	2 ^c	5	50	50	50	50	20	53	50	CAD
Styrene	105	86	86	100	85		85	50	86	43	CAD
Hydrogen peroxide	1.4	0.71	1.4	1.5	1.5		1.4	0.4	1.4	1.4	CAD
Diethyl phthalate	3		5	5	5		3	5 ^c	5	3	CAD
Butan-1-ol	150	310	150		61 ⁱ		150	50	61	45	CAD
Dimethyl phthalate	3		5	5	5			5 ^c	5	3	CAD
Zinc oxide, fume or respirable dust	4			5	2		5 ^b	5	2		CAD
Titanium dioxide	6 ^d			11 ^c	4 ^b ; 10 ^c			10 ^c	10 ^c	5 ^c	CAD
Boron oxide	10			10	10			10	10		CAD
Tin compounds, organic, except Cyhexatin (ISO)	0.1			0.1			0.1 ^c		0.1	0.1	CAD
Tin compounds, inorganic, except SnH ₄	0.1				2		2 ^c	2	2		CAD
Copper and its compounds, inorganic						0.1	1 ^c	0.2 ^c	0.1 ^b	0.01 ^b	CAD
Platinum compounds, soluble	0.002				0.002		0.002 ^c			0.002	CAD
Tin compounds, organic			0.1		0.1				0.1	0.1	CAD
Tin, metal			2		2				2		CAD
Zinc oxide, dust				10					10	5	CAD
Boric acid and sodium borate		0.5 ^c			2				2		CAD
Tin, tri-n-butyl tin compounds	0.05	0.009 ^c					0.05				CAD
Tin compounds, inorganic						2				2	CAD
Azodicarbonamide			0.5		1						CAD
Borates, tetra, sodium salts, anhydrous, Sodiumtetraborate			0.5		1						CAD
Fibres, man made vitreous										0.2 ^e ;	CAD

Substance	Denmark	Germany (AGS)	Finland	France	Ireland	The Netherlands	Austria	Poland	Spain	Sweden	ACSH priority
(amorphous) fibres ^a										0.2 ^f ; 1 ^g	
Fibrous dust, man-made mineral (if carcinogenic) ^a							0.5				CAD
Hydrogen peroxide, aqueous solution			1.4								CAD
Mineral fibres ^a			1								CAD
Platinum, soluble salts			0.002								CAD
Tin compounds, inorganic, except oxides										2	CAD
Tin oxide			2								CAD
Tin(II) chloride			2								CAD
Tin(II) compounds, inorganic		8 ^c									CAD
Tin(II) fluoride			2								CAD
Tin(II) methanesulfonate			2								CAD
Tin(IV) compounds, inorganic		2 ^c									CAD
Tin(IV) oxide			2								CAD
Zinc oxide			2								CAD
Cobalt and its compounds	0.01	0.005 ^b	0.02		0.02	0.02	0.1 ^h	0.02	0.02	0.02	CMRD immediate
Cobalt carbonyl	0.1			0.1	0.1		0.1 ^h		0.1		CMRD immediate
Cobalt hydrocarbonyl	0.1			0.1		0.1			0.1		CMRD immediate
Cobalt naphtenate			0.02								CMRD immediate
Benzyl chloride	5		2.6	5	5 ⁱ		0.2 ^h	3	5.3	5	CMRD next level
Pyrocatechol	20		22	20			20 ^c		23	20	CMRD

Substance	Denmark	Germany (AGS)	Finland	France	Ireland	The Netherlands	Austria	Poland	Spain	Sweden	ACSH priority
											next level
Ethylene imine	1				0.1	0.0009	0.9	0.62	0.36		CMRD next level
Silicon carbide (not whiskers)				10 ^b	3 ^b ; 10 ^c		4 ^b	10 ^c	3 ^b ; 10 ^c		CMRD next level
2-Butanone oxime	83 ^{i,j}	1			10						CMRD next level
Silicon carbide fibres (incl. whiskers), respirable fraction					4						CMRD next level

a Fibres per cm³

b Respirable fraction

c Inhalable fraction

d Total dust

e Refractory ceramic fibres

f Special purpose fibres

g Other fibres

h TRK value (Technical Guidance Concentration; based on technical feasibility)

i Converted from ppm to mg/m³

j Provisional

A.3 Epilogue

This addendum provides insight into the current consensus between member states concerning the 46 previously selected substances without an EU OEL. It supports the prioritising process for setting EU OELs by providing this information.

Most substances (36) are prioritised under the CAD by ACSH. The top ranked substances show a high number of available national OELs across the selected member states, with minor variability. Notably, for platinum metal all 10 member states have implemented the same national TWA-8h OEL (namely, 1 mg/m³). A further four substances are prioritised under CMRD (immediate), with two of these substances having agreement between all member states with national OELs available. Lastly, six substances are prioritised under CMRD (next level), with the highest ranked substances having multiple national OELs available.

For a number of substances, clusters of national OELs can be seen in the variability diagrams with one or a few outliers. These outliers could possibly be explained by a health-based reasoning or by a difference in the specific fraction for which the OEL was set (e.g. respirable fraction OELs are generally lower than inhalable fraction OELs). If there was more information available on the specific fractions on which national OELs were based, the variability might become smaller as they can be grouped based on that information. An alternative explanation might be the year in which the OEL was derived, with older OELs possibly following older guiding principles. Unfortunately, this information was not readily available.

For completeness, the absolute difference rather than the relative difference between national OELs was also considered as an indication for the variability. This resulted in no meaningful differences from the current ranking.

A.4 Glossary

ACSH	Advisory Committee on Safety and Health at Work
AGS	Ausschuss für Gefahrstoffe
CAD	Chemical Agents Directive (98/24/EC)
CAS number	Chemical Abstracts Service number
CLV	Ceiling Limit Value
CMRD	Carcinogens, Mutagens or Reprotoxic substances at work Directive (2004/37/EC)
EU OEL	Occupational Exposure Limit on a European level
Health-based	Based on dose-response relation
mg/m ³	Milligrams per cubic metre
National OEL	Occupational Exposure Limit in one of the EU Member States
OEL	Occupational Exposure Limit
ppm	Parts per million
STEL-15m	Short-Term Exposure Limit (15 minutes)
TRK value	Technical Guidance Concentration, based on technical feasibility
TWA-8h	Time-weighted average (8 hours)

