
ZDHC Air Emissions Guidelines

Version 1.0
August 2024

NOTES

ZDHC refers to the UN GHS (Globally Harmonized System of Classification and Labelling of Chemicals) as the internationally recognised standard for hazardous material classification and labelling. All the other national and/or regional existing schemes derived from the implementation of the UN GHS, have to be considered included in the list of the accepted ZDHC standards for this purpose.

DISCLAIMERS

The ZDHC Foundation (hereinafter “ZDHC”) Air Emissions Guidelines V1.0 is not intended to replace brand-specific requirements for air emissions management, but to be supportive or complimentary to such requirements.

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- Compliance with, or take the place of, legal or regulatory requirements. Examples might include: stricter legal, local or regional regulatory requirements on the tracking and monitoring of air emissions any requirements as set forth in this document.
- Compliance with, or conformance to, any national or international environmental or workplace safety requirements, including, but not limited to, relevant regulations and/or standards. Nor do the ZDHC Air Emissions Guidelines V1.0 replace the above-mentioned regulations and/or standards.

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For any results obtained or not obtained from the use of the ZDHC Air Emissions Guidelines V1.0.

For the avoidance of doubt this Disclaimer applies to all related documents produced by the ZDHC Group.

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Table 2	Performance criteria for VOCs emissions (100% PTE)



List of Terms (Abbreviations)

ACGIH	American Conference of Governmental Industrial Hygienists
BAT	Best Available Techniques
CO	Carbon monoxide
CO ₂ eq.	Is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential. ¹
DRE	Destruction Removal Efficiency
EU OSHA	European Agency for Safety and Health at Work
GHG	Greenhouse gases
GWP	Global warming potential
HAP	Hazardous Air Pollutants
NH ₃	Ammonia
NO _x	Nitrogen oxides
ODS	Ozone depleting substance
OWR	Oil water repellents
PM	Particulate matter
PTE	Potential to Emit
SBTi	Science-Based-Target-Initiative
SO _x	Sulphur oxides
SDS	Safety Data Sheet
TAP	Toxic Air Pollutants
TPA	Tons per annum
US OSHA	Occupational Safety and Health Administration
VOC	Volatile Organic Compounds
ZDHC MRSL –	ZDHC Manufacturing Restricted Substances List



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Collaborative process and acknowledgements

The fundamental principle of collaboration at ZDHC was followed in the development of this document. The Task Team on Air Emissions that was formed in 2019 and which put together the Air Emissions Position Paper was reactivated for the purposes of this document. Where needed, new members from ZDHC Signatories were included in the Task Team. In addition to the Task Team, an external consultant was brought in to provide technical inputs and help shape the document.

The ZDHC Air Competence Centre and Roadmap to Zero (RtZ) Delivery teams co-ordinated with members of the Task Team through a series of calls, hackathons, e-mails and 1:1 calls to gather and collate inputs for the document. A draft document prepared by the ZDHC Air Competence Centre was reviewed by the Air Emissions Task Team members and by ZDHC Signatories and Advisory Groups. Based on the feedback and suggestions received, the final document was prepared and published.

We acknowledge and thank the contribution of the Air Emissions Task Team members and ZDHC Signatories for their assistance in the development of this document. For a full list of acknowledgements, please see the end of this document.

Introduction

In 2019, a task team of experts from ZDHC Signatories was convened to draft and publish a position paper on air emissions for the industry. The aim of the [ZDHC Air Emissions Position Paper](#) is to reinforce expectations, highlight areas of opportunity and propel the industry towards greater responsibility in controlling its impact on communities and the environment. The limits and recommendations shared in the Air Emissions Position Paper were meant to give direction to the industry, where there is no existence of harmonised standards for air emissions across the industry. The intent of the Air Emission Position Paper was to transition it into an Air Emissions Guidelines document, with a standardised cadence and framework to monitor and track performance across the global apparel, textile, leather and footwear value chain.

Transitioning the Air Emissions Position Paper into guidelines requires a step-by-step approach. That approach first creates awareness by helping facilities to identify and understand the types of emission sources and pollutants that are emitted. Then moves further into tracking and reporting emissions of key pollutants associated with facility operations and production, followed by adoption and implementation of Best Available Techniques (BAT), including equipment and processes, to minimise air emissions.

The intention is not to overwhelm the value chain with testing and reporting in the initial phase but to provide calculation models for suppliers to understand their status quo on key pollutants and plan improvement actions. ZDHC's philosophy is to work on input chemistry, with the aim to manage output. Therefore our focus within this guidelines document is on input chemistry management leading to cleaner air.

Through version updates, ZDHC will provide a roadmap for suppliers in reducing air emissions and its impact on workers, communities, ecosystems and the planet. The ZDHC Air Emissions Guidelines V1.0 is the first step in this roadmap, which will expand to include the following aspects of the ZDHC Air Emissions Position Paper (not necessarily in the below sequence):

- 1) Derivation and application of emission factors to calculate actual VOC emissions from a chemical inventory used in production processes.
- 2) Monitoring of emissions (NO_x, SO_x, CO, PM) from the combustion of fuels in stacks/boilers (facility operations) as described in Appendix A – Table 1 in the Air Emissions Position Paper at Foundational/Progressive/Aspirational Levels through use of emission factors calculations.²
- 3) Evaluation of human exposure (occupational health and safety) to workplace emissions from ZDHC MRSL substances in relation to the limits prescribed by ACGIH, US OSHA and EU OSHA described in Appendix A – Table 2 in the Air Emissions Position Paper. This table will be updated to the latest ZDHC MRSL version. This will be a separate requirement from the other requirements in the Air Emissions Guidelines.
- 4) Monitoring of HAP/TAP, NH₃ and Ozone Depleting Substances (ODS) to ambient air from production operations using calculations; air dispersion modelling; Destruction Removal Efficiency (DRE) techniques.
- 5) Connecting chemical inventory and processes with potential GHG emissions and utilising this information to build a decarbonisation roadmap through sustainable chemical management (including process optimisation and resource efficiency).
- 6) Sampling and testing requirements for pollutants listed in the ZDHC Air Emissions Guidelines, with reporting on the appropriate ZDHC platform.

V1.0 of the ZDHC Air Emissions Guidelines focuses on **VOC emissions** from input formulations through an estimation of the Potential to Emit from ingredients used in the formulations on a 100% basis, using simple calculations. This will help suppliers to monitor their chemical inventory, understand their status quo of VOC emissions and plan actions for the abatement of VOC emissions in their facility through safer chemical substitution and/or engineering controls at the facility.

Apparel, textile, leather and footwear processing is the most greenhouse gas (GHG) intensive part of supply chains, as there is the need for heat generation in a lot of processes like dyeing, tanning, drying, finishing, curing, etc. To reduce GHG emissions, suppliers must optimise their processes or change the chemistry used in the processes to make them resource efficient in terms of water and energy use. Thus, GHG emissions has been identified as a key impact area for the ZDHC Roadmap to Zero Programme. We need to capture the relevant GHG data to better understand the dependencies of GHG and chemistry to support suppliers in reducing their GHG emissions.

We also do not want to duplicate existing industry and regulatory requirements, but to align with these. We expect facilities are engaged and reporting their GHG data for these requirements. Therefore, in V1.0 we will capture the current GHG emissions in terms of kg of CO₂ eq. (Scope 1 and Scope 2)³, which suppliers are already reporting on existing initiatives (for example – Cascale MCAP, UNFCCC, Aii Climate Solutions Portfolio, etc.). Suppliers who are not engaged with an existing industry platform can use the ZDHC platform to input their data and calculate their GHG emissions for Scope 1 and Scope 2. This will allow ZDHC to further research/develop how the Roadmap to Zero Programme can support/accelerate the reduction of GHGs.

ZDHC aligns with the goal of the Fashion Industry Charter for Climate Action.⁴

Objective

The ZDHC Air Emissions Guidelines V1.0 will focus on VOCs (as listed in Appendix A) to help suppliers gain insight into their baseline status and plan improvement actions to reduce VOC emissions into the ambient air. The calculation will be done on the basis of the 100% Potential to Emit (PTE) VOCs based on the chemical inventory used in their production processes.

The ZDHC Air Emissions Guidelines V1.0 will also include expectations from suppliers for actions on their GHG emissions.



In relation to VOCs, the ZDHC Air Emissions Guidelines V1.0 will provide:

- 1) A chemical inventory template to capture data on the ingredients used in each formulation, obtained through the relevant GHS compliant Safety Data Sheet (SDS).
- 2) Calculation methodology for VOC emissions from formulations based on 100% PTE.
- 3) Evaluation of suppliers at foundational, progressive or aspirational performance levels based on the calculated values for PTE in VOCs from the ZDHC platform.

In relation to GHG, the V1.0 guidelines set expectations for:

- 1) Accounting their Scope 1 and Scope 2 GHG emissions.
- 2) Setting targets to reduce their GHG emissions.

Scope

In scope:

- VOC emissions from chemical inventory used in production processes in apparel, textile, leather and footwear facilities as per Appendix B
- GHG Scope 1 and Scope 2 emissions

Out of scope:

- Sampling, analytical testing and occupational health & safety testing
- Wastewater / ETP emissions to air
- Sludge emissions to air
- MMCF production (please refer to [ZDHC MMCF Guidelines V2.2](#) for applicable air emissions criteria)
- Chemical manufacturing



CHAPTER 1

Requirements of ZDHC Air Emissions Guidelines V1.0

1.1 Chemical inventory data

In order to calculate the Potential to Emit (PTE) VOCs from the chemical inventory used in production processes (as per Appendix B), the supplier must capture relevant information about the chemical inventory at their facility and upload this data in the relevant ZDHC platform. This information is already a part of the Chemical Inventory List (CIL) structure that suppliers are expected to maintain.

A suggested template to document this data is given below:

Table 1: Chemical inventory ingredient information

No	Formulation name	Ingredient information (as given in Section 3 of the GHS-compliant SDS)			Total annual consumption (Kg)
		Substance name	CAS Number	%	
e.g	Adhesive XYZ	Methyl acetate	79-20-9	40-60	3,600
		Heptane	142-82-5	10-20	
		Ammonium Carbamodithioic acid (2-hydroxy ethyl)	38123-09-0	< 3	
1					
2					

1.2 Calculation of VOC emissions

The 100% Potential to Emit (PTE) of VOCs based on ingredient information in the chemical inventory is calculated as follows:

$$\text{PTE (kg)} = \text{Max concentration (\%)} \text{ of a substance in formulation} \times \text{annual usage of the formulation (kg)}$$

For the above example (adhesive XYZ), the PTE calculation will be done as follows:

- PTE for methyl acetate = 60% x 3600kg = 2160kg per annum
- PTE for heptane = 20% x 3600kg = 720kg per annum
- Total PTE for adhesive XYZ = 2160kg + 720kg = 2880kg per annum = 2.8 tons per annum

The PTE VOC calculations for all the formulations from the chemical inventory uploaded in the ZDHC platform will be summed up to arrive at the Total VOC value (in terms of 100% PTE) in tons per annum (TPA) for the facility as per VOCs listed in Appendix A.

1.3 Performance criteria for VOCs from a chemical inventory

Based on the VOCs emission calculations from the chemical inventory, the supplier is categorised into one of the three levels based on the performance criteria below.

Table 2: Performance criteria for VOCs emissions (100% PTE)

Level	Performance criteria for VOCs through chemicals
Foundational	PTE of VOC capped at 25 tons/year
Progressive	PTE of VOC capped at 15 tons/year
Aspirational	PTE of VOC capped at 5 tons/year

**If the PTE of VOC exceeds 25 tons/year, the supplier does not meet the Foundational Level.*

At each performance level, the supplier is expected to make continuous efforts to reduce the VOC emissions and to ensure worker safety from the VOC exposure by providing adequate engineering controls and applicable PPE to the workers. For best practices, please refer to the [ZDHC Responsible Solvents Approach Guidelines](#).

CHAPTER 2

Expectations for GHG emissions

2.1 Expectations from suppliers

At a minimum, suppliers should work on:

- Accounting their Scope 1 & Scope 2 GHG emissions as per GHG protocol.⁵
- Setting GHG-reduction goals (based on the principles of the Science-Based-Target-Initiative SBTi).⁶

Voluntarily, suppliers can account for their Scope 3 GHG emissions (relevant categories). In any case, suppliers must ensure to meet expectations set by regulators.

ZDHC acknowledges existing GHG calculations and reporting industry platforms for the above expectations. Suppliers should report their GHG emissions data (in terms of kg of CO₂ eq.) from these existing platforms to the ZDHC platform.

Suppliers not engaged with existing industry platforms can use the ZDHC platform to input their activity data and calculate their GHG emissions for Scope 1 and Scope 2.

2.2 Expectations from ZDHC

ZDHC supports the [Fashion Industry Charter for Climate Action](#) that provides overarching guidance on how to limit and reduce GHG emissions. In addition to supporting the Charter's vision and mission, ZDHC has embedded a commitment to reduce GHG emissions and mitigate the impacts of climate change in its 2030 Impact Strategy, based on the ZDHC MRS� Sustainable Chemical Management Framework.

Collaborative efforts with the Fashion Industry Charter and its signatories, as well with like-minded organisations (under the [apparel alliance](#)) and their related tools are part of our objectives. With our collaboration partners, we are working on a joint pathway for monitoring and evaluation of activities related to climate action.

ZDHC seeks to add value to the industry's efforts in reducing GHG emissions linked to chemical inventory and processes in the apparel, textile, leather and footwear industry through sustainable chemical management (including process optimisation and resource efficiency).

In the meantime, ZDHC will evaluate how data can be collected most efficiently, accurately and with the greatest potential to support continuous improvement of GHG emission reduction.

References

- 1) CO₂ EQUIVALENT [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Carbon dioxide equivalent#:~:text=A%20carbon%20\[...\].ame%20global%20warming](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Carbon_dioxide_equivalent#:~:text=A%20carbon%20[...].ame%20global%20warming)
- 2) DEFRA: <https://www.gov.uk/government/publications/green-house-gas-reporting-conversion-factors-2022>
- 3) EMBER: (<https://ember-climate.org/data-catalogue/yearly-electricity-data/>)
- 4) Fashion Industry Charter for Climate Action <https://unfccc.int/sites/default/files/resource/Industry%20Charter%20%20Fashion%20and%20Climate%20Action%20-%202022102018.pdf>
- 5) GHG Protocol <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>
- 6) Science-Based-Targets-Initiative (SBTi) (<https://sciencebasedtargets.org/>)

List of acknowledgements

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Appendix A: US EPA and EU EPA comprehensive list of VOCs

Systematic Name	List	CAS #
Benzene, methyl-, .alpha.-chlorinated	CERCLIS3	
Benzene, (1-methylethenyl)-	CERCLIS3	98-83-9
Ethane, 1,1,1,2-tetrachloro-2,2-difluoro-	CERCLIS3	76-11-9
Ethane, 1,1,2-trichloro-	CERCLIS3	79-00-5
Ethane, 1,1-dichloro-1-nitro-	CERCLIS3	594-72-9
Ethene, 1,1-dichloro-	CERCLIS3	75-35-4
Cyclohexane, 1,1-dimethyl-	CERCLIS3	590-66-9
Ethane, 1,1,1,2-tetrachloro-	CERCLIS3	630-20-6
Propane, 1,2,3-trichloro-	CERCLIS3	96-18-4
Benzene, 1,2-dichloro-	CERCLIS3	95-50-1
1-Propene, 1,3-dichloro-, mixture with 1,2-dichloropropane	CERCLIS3	8003-19-8
Benzene, 1,2-dimethyl-	CERCLIS3	95-47-6
Oxirane, 2-ethyl-	CERCLIS3	106-88-7
1,3-Butadiene	CERCLIS3	106-99-0
Benzene, 1,3-dichloro-	CERCLIS3	541-73-1
1-Propene, 1,3-dichloro-	CERCLIS3	542-75-6
2-Pentanol, 4-methyl-, 2-acetate	CERCLIS3	108-84-9
2-Butene, 1,4-dichloro-	CERCLIS3	764-41-0
1-BUTOXY-2-PROPANOL	EU	5131-66-8
Propane, 1-chloro-1-nitro-	CERCLIS3	600-25-9
Propane, 1-nitro-	CERCLIS3	108-03-2
Pentane, 2,2,4-trimethyl-	CERCLIS3	540-84-1

Systematic Name	List	CAS #
1-Propene, 2,3-dichloro-	CERCLIS3	78-88-6
Ethylene glycol butyl ether	EU	111-76-2
Ethane, 2-chloro-1,1,1-trifluoro-	CERCLIS3	75-88-7
Ethene, (2-chloroethoxy)-	CERCLIS3	110-75-8
Propane, 2-nitro-	CERCLIS3	79-46-9
2-Propyn-1-ol	CERCLIS3	107-19-7
1-Propene, 3-chloro-2-methyl-	CERCLIS3	563-47-3
2-Pentanone, 4-methyl-	CERCLIS3	108-10-1
Acetaldehyde	CERCLIS3	75-07-0
Acetic acid	CERCLIS3	64-19-7
Acetic acid, propyl ester	CERCLIS3	109-60-4
Acetic acid, 1,1'-anhydride	CERCLIS3	108-24-7
2-Propanone	CERCLIS3	67-64-1
Acetyl bromide	CERCLIS3	506-96-7
Acetyl chloride, 2,2-dichloro-	CERCLIS3	79-36-7
Ethyne	CERCLIS3	74-86-2
Ethene, 1,2-dichloro-	CERCLIS3	540-59-0
Ethane, 1,1,2,2-tetrabromo-	CERCLIS3	79-27-6
2-Propenal	CERCLIS3	107-02-8
2-Propenoyl chloride	CERCLIS3	814-68-6
Ethanamine	CERCLIS3	75-04-7
Aziridine	CERCLIS3	151-56-4
Ethane, 2-bromo-1-chloro-1,1-difluoro-	CERCLIS3	421-01-2
Methane, tribromo-	CERCLIS3	75-25-2

Systematic Name	List	CAS #
Methane, bromo-	CERCLIS3	74-83-9
Ethane, 1,1,2-trichloro-1,2,2-trifluoro-	CERCLIS3	76-13-1
Methane, dibromochloro-	CERCLIS3	124-48-1
Ethane, chloro-	CERCLIS3	75-00-3
Ethanol, 2-chloro-	CERCLIS3	107-07-3
Methane, trichloro-	CERCLIS3	67-66-3
Methane, chloro-	CERCLIS3	74-87-3
Methane, chloromethoxy-	CERCLIS3	107-30-2
Carbamic acid, (3-chlorophenyl)-, 1-methylethyl ester	CERCLIS3	101-21-3
2-Pentanone, 4-hydroxy-4-methyl-	CERCLIS3	123-42-2
Methane, diazo-	CERCLIS3	334-88-3
4-Heptanone, 2,6-dimethyl-	CERCLIS3	108-83-8
Methane, dibromodifluoro-	CERCLIS3	75-61-6
Phosphoric acid, dibutyl ester	CERCLIS3	107-66-4
Ethyne, dichloro-	CERCLIS3	7572-29-4
Methane, bromodichloro-	CERCLIS3	75-27-4
Methane, dichlorodifluoro-	CERCLIS3	75-71-8
Methane, dichloro-	CERCLIS3	75-09-2
Benzene, (dichloromethylsilyl)-	CERCLIS3	149-74-6
Methane, dichlorofluoro-	CERCLIS3	75-43-4
Propane, 1,2-dichloro-	CERCLIS3	78-87-5
Silane, dichloro-	CERCLIS3	4109-96-0
3-Pentanone	CERCLIS3	96-22-0
Ethanamine, N-ethyl-	CERCLIS3	109-89-7

Systematic Name	List	CAS #
2-Propanamine, N-(1-methylethyl)-	CERCLIS3	108-18-9
1,3-Dioxan-4-ol, 2,6-dimethyl-, 4-acetate	CERCLIS3	828-00-2
Silane, dichlorodimethyl-	CERCLIS3	75-78-5
N, N Dimethylformamide		68-12-2
Hydrazine, 1,1-dimethyl-	CERCLIS3	57-14-7
1-Propene, 1-chloro-2-methyl-	CERCLIS3	513-37-1
4-Heptanone	CERCLIS3	123-19-3
Ethane	CERCLIS3	74-84-0
Ethanol, 1,2-dichloro-, acetate	CERCLIS3	10140-87-1
Ethanol, 2-amino-	CERCLIS3	141-43-5
Acetic acid ethyl ester	CERCLIS3	141-78-6
2-Propenoic acid, ethyl ester	CERCLIS3	140-88-5
Ethanol	CERCLIS3	64-17-5
Ethane, bromo-	CERCLIS3	74-96-4
3-Heptanone	CERCLIS3	106-35-4
Carbonochloridic acid, ethyl ester	CERCLIS3	541-41-3
Ethane, 1,1'-oxybis-	CERCLIS3	60-29-7
Ethane, isocyanato-	CERCLIS3	109-90-0
3-Heptanone, 5-methyl-	CERCLIS3	541-85-5
Benzene, ethyl-	CERCLIS3	100-41-4
Ethene	CERCLIS3	74-85-1
Ethane, 1,2-dichloro-	CERCLIS3	107-06-2
Ethanol, 2-fluoro-	CERCLIS3	371-62-0
Thiirane	CERCLIS3	420-12-2

Systematic Name	List	CAS #
1,2-Ethanediamine	CERCLIS3	107-15-3
Ethane, 1,1-dichloro-	CERCLIS3	75-34-3
Benzene, ethylmethyl-	CERCLIS3	25550-14-5
Benzene, ethyldimethyl-	CERCLIS3	29224-55-3
Formaldehyde	CERCLIS3	50-00-0
Acetonitrile, 2-hydroxy-	CERCLIS3	107-16-4
Formamide	CERCLIS3	75-12-7
Formic acid	CERCLIS3	64-18-6
Methane, trichlorofluoro-	CERCLIS3	75-69-4
Ethane, 1,1,2,2-tetrachloro-1,2-difluoro-	CERCLIS3	76-12-0
Ethane, 1,2-dichloro-1,1,2,2-tetrafluoro-	CERCLIS3	76-14-2
Oxiranecarboxaldehyde	CERCLIS3	765-34-4
Methane, bromotrifluoro-	CERCLIS3	75-63-8
Heptane	CERCLIS3	142-82-5
2-Propanone, 1,1,1,3,3,3-hexafluoro-	CERCLIS3	684-16-2
Hexane	CERCLIS3	110-54-3
1-Butanol, 3-methyl-, 1-acetate	CERCLIS3	123-92-2
1-Butanol, 3-methyl-	CERCLIS3	123-51-3
Acetic acid, 2-methylpropyl ester	CERCLIS3	110-19-0
1-Propanol, 2-methyl-	CERCLIS3	78-83-1
Carbonochloridic acid, 2-methylpropyl ester	CERCLIS3	543-27-1
1-Propanamine, 2-methyl-	CERCLIS3	78-81-9
Propanal, 2-methyl-	CERCLIS3	78-84-2
Propanenitrile, 2-methyl-	CERCLIS3	78-82-0

Systematic Name	List	CAS #
Isooctanol	CERCLIS3	26952-21-6
1,3-Butadiene, 2-methyl-	CERCLIS3	78-79-5
Acetic acid, 1-methylethyl ester	CERCLIS3	108-21-4
2-Propanol	CERCLIS3	67-63-0
Benzene, (1-methylethyl)-	CERCLIS3	98-82-8
Carbonochloridic acid, 1-methylethyl ester	CERCLIS3	108-23-6
Propane, 2,2'-oxybis-	CERCLIS3	108-20-3
2-Propanamine	CERCLIS3	75-31-0
Ethenone	CERCLIS3	463-51-4
Acetic acid, lead (2+) salt (2:1)	CERCLIS3	301-04-2
2-Hexanone	CERCLIS3	591-78-6
Acetic acid, mercury (2+) salt (2:1)	CERCLIS3	1600-27-7
Benzene, 1,3,5-trimethyl-	CERCLIS3	108-67-8
Methanamine, N-methyl-N-nitroso-	CERCLIS3	62-75-9
Methane	CERCLIS3	74-82-8
2-Propenoic acid, 2-chloro-, methyl ester	CERCLIS3	80-63-7
Acetic acid, methyl ester	CERCLIS3	79-20-9
2-Propenoic acid, methyl ester	CERCLIS3	96-33-3
Methanol	CERCLIS3	67-56-1
Ethane, 1,1,1-trichloro-	CERCLIS3	71-55-6
Acetonitrile	CERCLIS3	75-05-8
2-Butanone	CERCLIS3	78-93-3
2-Butanone, peroxide	CERCLIS3	1338-23-4
Formic acid, methyl ester	CERCLIS3	107-31-3

Systematic Name	List	CAS #
Methane, iodo-	CERCLIS3	74-88-4
2-Hexanone, 5-methyl-	CERCLIS3	110-12-3
2-Butanone, 3-methyl-	CERCLIS3	563-80-4
Mercury, dimethyl-	CERCLIS3	593-74-8
Mercury (1+), methyl-	CERCLIS3	22967-92-6
2-Propenoic acid, 2-methyl-, methyl ester	CERCLIS3	80-62-6
2-Heptanone	CERCLIS3	110-43-0
2-Pentanone	CERCLIS3	107-87-9
Propane, 2-methoxy-2-methyl-	CERCLIS3	1634-04-4
3-Buten-2-one	CERCLIS3	78-94-4
Methanamine	CERCLIS3	74-89-5
Silane, chloromethyl-	CERCLIS3	993-00-0
Cyclohexane, methyl-	CERCLIS3	108-87-2
Silane, dichloromethyl-	CERCLIS3	75-54-7
Methane, dibromo-	CERCLIS3	74-95-3
Hydrazine, methyl-	CERCLIS3	60-34-4
Silane, trichloromethyl-	CERCLIS3	75-79-6
2-Propanone, 1-chloro-	CERCLIS3	78-95-5
Benzene, chloro-	CERCLIS3	108-90-7
Morpholine	CERCLIS3	110-91-8
Benzene, 1,3-dimethyl-	CERCLIS3	108-38-3
Acetic acid, butyl ester	CERCLIS3	123-86-4
1-Butanol	CERCLIS3	71-36-3
Butane, 1,1'-oxybis-	CERCLIS3	142-96-1

Systematic Name	List	CAS #
Acetic acid, nickel (2+) salt (2:1)	CERCLIS3	373-02-4
Ethane, nitro-	CERCLIS3	79-24-3
Methane, nitro-	CERCLIS3	75-52-5
Propane, nitro-	CERCLIS3	25322-01-4
Nonane	CERCLIS3	111-84-2
Nitric acid, propyl ester	CERCLIS3	627-13-4
Octane	CERCLIS3	111-65-9
Benzene, 1-chloro-2-methyl-	CERCLIS3	95-49-8
Oxirane	CERCLIS3	75-21-8
Paraformaldehyde	CERCLIS3	30525-89-4
Benzene, 1,4-dimethyl-	CERCLIS3	106-42-3
Ethene, 1,1,2,2-tetrachloro-	CERCLIS3	127-18-4
1,4-Dioxane	CERCLIS3	123-91-1
Ethane, 1,1,1,2,2-pentachloro-	CERCLIS3	76-01-7
Pentane	CERCLIS3	109-66-0
Ethane, 1,1,1,2,2,2-hexachloro-	CERCLIS3	67-72-1
Benzene, 1,1'-oxybis-	CERCLIS3	101-84-8
Hydrazine, phenyl-	CERCLIS3	100-63-0
Hydrazine, phenyl-, hydrochloride (1:1)	CERCLIS3	59-88-1
Propane	CERCLIS3	74-98-6
1-Propanol	CERCLIS3	71-23-8
1-Propyne, 3-bromo-	CERCLIS3	106-96-7
Benzene, 1-propenyl-	CERCLIS3	637-50-3
Propanal	CERCLIS3	123-38-6

Systematic Name	List	CAS #
Propanoic acid	CERCLIS3	79-09-4
Propanenitrile	CERCLIS3	107-12-0
Carbonochloridic acid, propyl ester	CERCLIS3	109-61-5
1-Propene	CERCLIS3	115-07-1
Propane, dichloro-	CERCLIS3	26638-19-7
Oxirane, 2-methyl-	CERCLIS3	75-56-9
Aziridine, 2-methyl-	CERCLIS3	75-55-8
1-Propyne	CERCLIS3	74-99-7
sec-Amyl acetate, all isomers and mixtures	CERCLIS3	
Acetic acid, 1-methylpropyl ester	CERCLIS3	105-46-4
2-Butanol	CERCLIS3	78-92-2
Stoddard solvent	CERCLIS3	8052-41-3
Ethene, 1,2-dichloro-, (1E)-	CERCLIS3	156-60-5
Ethane, trichloro-	CERCLIS3	25323-89-1
2-Propanol, 2-methyl-	CERCLIS3	75-65-0
Acetic acid, 1,1-dimethylethyl ester	CERCLIS3	540-88-5
Chromic acid (H₂CrO₄), bis(1,1-dimethylethyl) ester	CERCLIS3	1189-85-1
Ethane, 1,1,2,2-tetrachloro-	CERCLIS3	79-34-5
Tetrachloroethanol	CERCLIS3	
Plumbane, tetraethyl-	CERCLIS3	78-00-2
Stannane, tetraethyl-	CERCLIS3	597-64-8
Plumbane, tetramethyl-	CERCLIS3	75-74-1
Benzene, methyl-	CERCLIS3	108-88-3
1-Propene, 1,3-dichloro-, (1E)-	CERCLIS3	10061-02-6

Systematic Name	List	CAS #
2-Butene, 1,4-dichloro-, (2E)-	CERCLIS3	110-57-6
Acetic acid, 2,2,2-trichloro-	CERCLIS3	76-03-9
Acetyl chloride, 2,2,2-trichloro-	CERCLIS3	76-02-8
Ethene, 1,1,2-trichloro-	CERCLIS3	79-01-6
Silane, trichloroethyl-	CERCLIS3	115-21-9
Ethanol, 2,2,2''-nitritotris-	CERCLIS3	102-71-6
Silane, triethoxy-	CERCLIS3	998-30-1
Ethanamine, N, N-diethyl-	CERCLIS3	121-44-8
Methane, triiodo-	CERCLIS3	75-47-8
Phosphorous acid, trimethyl ester	CERCLIS3	121-45-9
Methanamine, N, N-dimethyl-	CERCLIS3	75-50-3
Silane, chlorotrimethyl-	CERCLIS3	75-77-4
Acetic acid ethenyl ester	CERCLIS3	108-05-4
Ethene, bromo-	CERCLIS3	593-60-2
Ethene, chloro-	CERCLIS3	75-01-4
2-Propenenitrile	CERCLIS3	107-13-1
Benzene, ethenyl-	CERCLIS3	100-42-5
Benzene, ethenylmethyl-	CERCLIS3	25013-15-4
Benzene, dimethyl-	CERCLIS3	1330-20-7
Xylene, bromo-	CERCLIS3	28258-59-5

Appendix B: Chemical products to be included in the chemical inventory for the calculation of PTE of VOCs

No	Type of chemical product
1	All dyes, pigments and inks directly applied in process
2	Functional finishes (such as antimicrobials, flames retardants, oil water repellents)
3	Printing thickeners and binders
4	Spot cleaners and other solvents
5	Chemicals used in wastewater/effluent treatment process (except commodity chemicals)
6	Chemicals used in engraving, developing and washing of printing screens
7	Sizing chemicals used for in-house warping or weaving
8	Weaving or knitting oils
9	Beamhouse, wet-end and finishing auxiliaries for leather production
10	Dyestuffs and pigments used in wet-end and finishing for leather production
11	Printing inks and auxiliaries used for printed leathers production
12	Adhesives and rubbers used in footwear and leather goods production