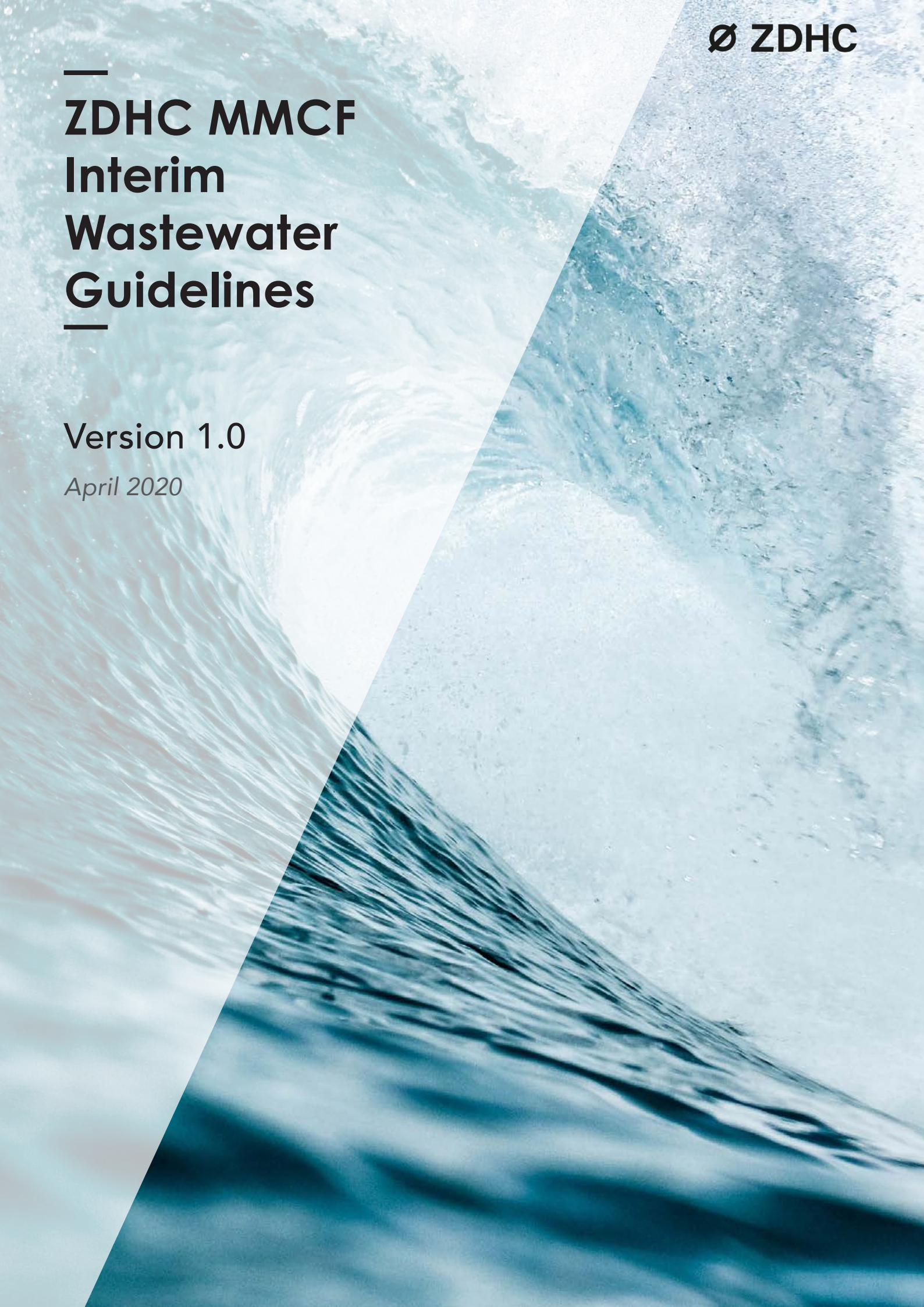
ZDHC

ZDHC MMCF Interim Wastewater Guidelines

Version 1.0

April 2020



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- It is not the intent of the ZDHC Foundation to act as an agency reporting wastewater and sludge discharge data to governments or authorities having jurisdiction. It is expected that manufacturing facilities are accountable for reporting on their wastewater and sludge discharges, in accordance with applicable laws.

Revision history

Version Number	Changes	Time of publication
Version 1.0	Initial publication of the ZDHC Man-Made Cellulosic Fibres Production Wastewater Guidelines	2020

Related Work

This document is one part of a series of solutions provided by ZDHC. Manufacturing facilities are expected to comply with the solutions applicable to them, considering the type of processes conducted in their facility. For that the following documents must be taken into account:

ZDHC MMCF Guidelines – The three guidelines are related among each other.

ZDHC MMCF Interim Wastewater Guidelines

ZDHC Wastewater Guidelines

ZDHC Wastewater and Sludge Laboratory Sampling and Analysis Plan (SAP)

Definitions

To help understanding the implementation of our documents the following definitions will be used to indicate requirements, recommendations, permissions and/or possibilities:

- Shall: Used to indicate a requirement.
- Should: Used to indicate a recommendation.
- May: Used to indicate permission.
- Can: Used to indicate possibility or capability.

For more definitions please click here.

Abbreviations

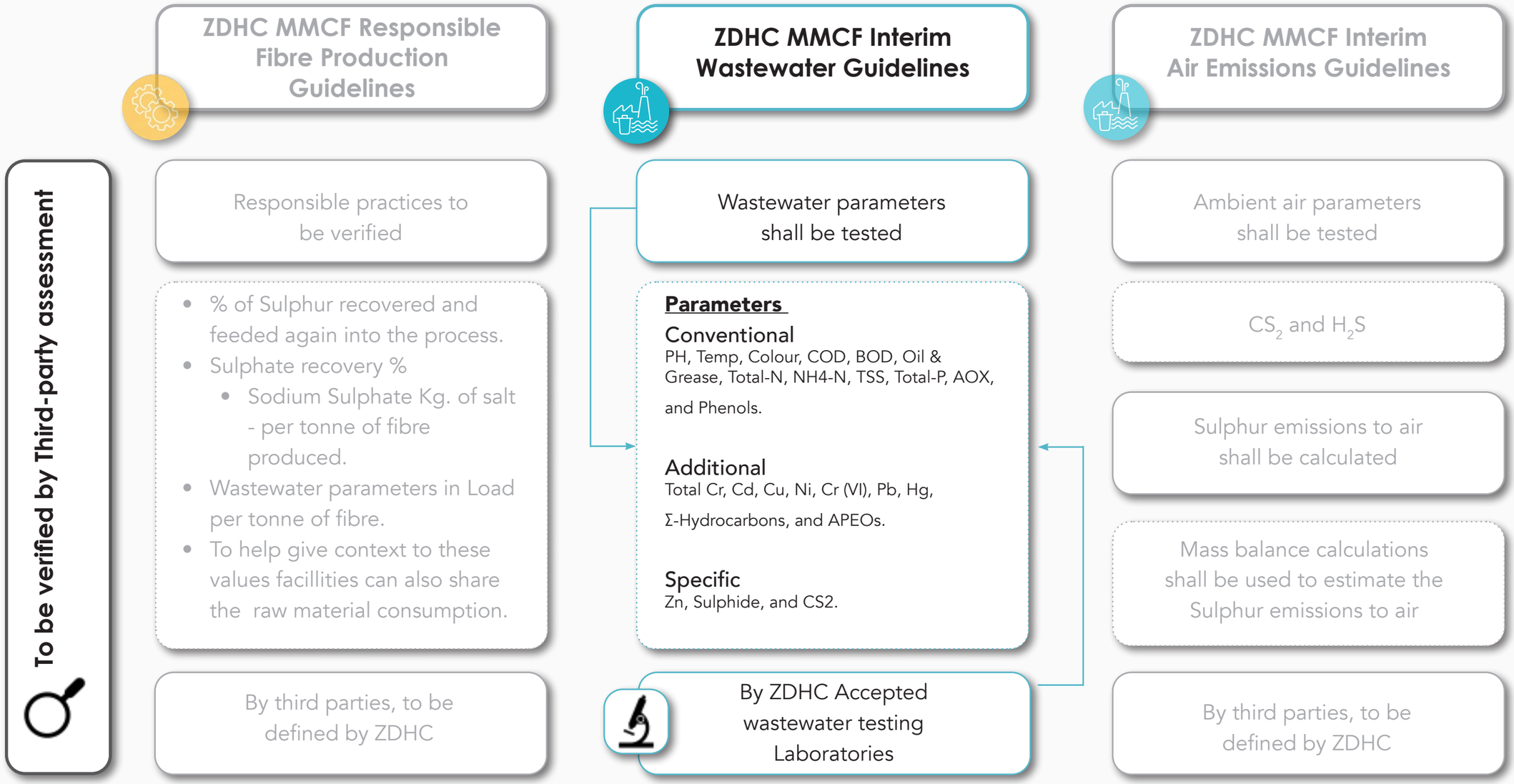
CETP	Centralised EffluentTreatment Plant
CIL	Chemical Inventory List
CMS	Chemical Management System
Cupro	Cuprammonium rayon
EN	European Norm
ETP	Effluent Treatment Plant
EU BAT BREF POL	EU-BAT BREF Reference Document on Best Available Techniques in the Production of Polymers (August 2007)
GB	Guojia Biaozhun (Chinese required national standard)
GB/T	Guojia Biaozhun/Tuījiàn, (Chinese recommended national stadard)
HJ/T	Chinese recommended environmental protection standard (Chinese industry standard)
IPE	Institute of Public & Environmental Affairs - Chinese Non-Governmental Organization
ISO	International Organization for Standardization
LC	Liquid Chromatography
MMCF	Man-Made Cellulosic Fibres
MRSL	Manufacturing Restricted Substances List
N/A	Not Available or Not Applicable
PTE	Potential to Emit
RL	Reporting Limit
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
WWTP	Wastewater Treatment Plant

Contents

Summary

In the last years MMCF has become an increasingly important fibre category, stimulated by the growing number of brands that have committed to use of preferred fibres[a]. With its production volume doubled in past decades it is expected to continue its market growth due to MMCF's sustainable potential. The ZDHC Roadmap to Zero Programme (ZDHC) recognises the value of addressing hazardous substances that may be discharged into the environment, generated across the value chain of the textile and footwear industry, and decided to address MMCF production process by collaboratively creating an aligned approach for manufacturing facilities by working towards a circular approach for the substances present in the process and to generate cleaner outputs from production.

As a multi-stakeholder initiative working towards a common goal, ZDHC understands that achieving it requires collaborative efforts in the industry. The ZDHC MMCF Guidelines is a set of guidelines that addresses integrated expectations for discharge wastewater quality, emissions to air, and chemical recovery for manufacturing facilities producing Man-Made Cellulosic Fibres.



[a] Textile Exchange – Preferred Fibre & Materials.

Introduction

The ZDHC Roadmap to Zero Programme (ZDHC) is a collaboration of brands, value chain affiliates and associates committed to eliminating hazardous substances from the textile, apparel and footwear value chain. ZDHC recognises that achieving this goal requires collaborative efforts in the industry, especially in regard to capacity building, time, technology, and innovation.

The ZDHC Programme recognises the value of addressing hazardous substances that may be discharged into the environment during the manufacture of materials used in the textile and footwear industry. That is hazardous substances, which could be used deep within the value chain and not just those substances that could be present in finished goods. Discharge of wastewater or air emissions containing hazardous substances could have a significant impact on the environment.

Background

In January 2018 ZDHC commissioned an expert report on the production of Man-Made Cellulosic Fibres (MMCF). The report concluded that due to technical limitations, the inclusion to the ZDHC MRSL of the chemical substance Carbon disulphide (CS_2) (used as a solvent for the production of Viscose and Modal) was not feasible - because a restriction of this chemical would halt the Viscose and Modal production processes. The conclusion was that the ZDHC Roadmap to Zero Programme could have substantial impact by collaboratively setting guidance around good chemical management. Alongside setting guidance limits for wastewater, sludge, air emissions and chemical recovery during fibre production while calling for continued further research into processes for the production of MMCF, using alternative and less hazardous substances.

Objective

ZDHC MMCF Guidelines

During the last years MMCF has become an increasingly important fibre category, incentivised by the growing number of brands committed to the use of preferred fibres[a]. With its production volume doubled in past decades it is expected to continue its market growth due to MMCF's sustainable potential. For this reason, ZDHC decided to address its production process by collaboratively creating an aligned approach for manufacturing facilities to generate cleaner outputs from production while including a circular approach to its process.

The ZDHC MMCF Guidelines is a set of guidelines that addresses integrated expectations for discharge wastewater quality, emissions to air, and chemical recovery for manufacturing facilities producing Man-Made Cellulosic Fibres.
The complete set includes:

- ZDHC MMCF Responsible Fibre Production Guidelines
- **ZDHC MMCF Interim Wastewater Guidelines**
- ZDHC MMCF Interim Air Emissions Guidelines

The ZDHC MMCF Guidelines should be implemented as one, as the outputs from the production process of fibres cannot be seen as separate. These three documents provide guidance for an aligned industry approach. With this set of documents, ZDHC appeals to its members and the entire industry to improve the quality of discharged industrial wastewater and production-related emissions to air. With this, ZDHC expects also to support the transition of the production of MMCF towards a circular approach, by proposing recovery rates for substances such as Sulphur compounds.

ZDHC aims to catalyse a roadmap to define milestones for fibre manufacturing facilities to advance towards the production described in EU BAT BREF Reference Document on Best Available Techniques for the Production of Polymers (EU BAT BREF POL). Aiming to achieve integrated prevention and control of pollution arising from the production, leading to a high level of environmental protection[i] (EUROPEAN COMMISSION - IPPC Bureau 2007).

[a] Textile exchange – Preferred Fibre & Materials.

The scope expansion plan of this document includes the outputs proceeding from the dissolving pulp[a] for MMCF fibres, and other fibres including but not limited to:

- Viscose Filament Yarn[a]
- Modal Filament Yarn[a]
- Lyocell[a]
- Cupro
- Acetate
- Triacetate
- Fibres based on next generation feedstock

In this document a three-level approach is proposed:

- As manufacturing facilities are not identical in terms of capabilities, knowledge, strategic priorities or resources, this document provides a three-level (foundational, progressive, aspirational) approach for the limit values and/or recovery rates of the proposed parameters.
- Manufacturing facilities shall proactively develop and manage a data-driven, continuous improvement plan to reach the next level. To create this continuous improvement plan, ZDHC MMCF Implementation Guidelines should be observed.

Levels defined:

- **Foundational**: First level to be achieved by manufacturing facilities at minimum.
- **Progressive**[b]: AAn intermediate level to be achieved by manufacturing facilities through the application of technologies such as, but not limited to, those mentioned in the Reference Document: EU-BAT BREF Reference Document on Best Available Techniques in the Production of Polymers, (EU BAT BREF POL) corresponding to the viscose production processes.
- **Aspirational**: To become best in class, manufacturing facilities shall achieve the third level, through the application of technologies such as, but not limited to, those mentioned in the Reference Document: EU-BAT BREF Reference Document on Best Available Techniques in the Production of Polymers (EU BAT BREF POL) applicable to viscose and beyond. This achievement sits alongside the supplier further enhancing their chemical management.

To learn more about the continuous improvement roadmap, see ZDHC MMCF Guidelines Implementation Plan.

[a] The work in order to add these fibres/process to the scope of this document will start in June 2020, and the publication date is yet to be defined,

[b] Approximately 43% of the global production market have active commitments of reaching this level by 2023-2025.

ZDHC MMCF
Interim Wastewater Guidelines

This document will address the expectations for wastewater discharge parameters and limit values related to the production of Man-Made Cellulosic Fibres.

This document includes the analytical testing methods and sampling procedures for wastewater testing, to enable brands and manufacturing facilities to share their testing results in a systematic and efficient manner via the ZDHC Gateway.

The expected outcomes of using this document are to:

- Ensure wastewater discharge does not have an adverse impact on communities and the environment.
- Provide a unified monitoring and testing programme for manufacturing facilities to systematically and efficiently share discharge/emission data with brands, and other interested parties.
- Increase operational efficiencies by defining a standard cadence for wastewater and reporting requirements which applies to all organisations that adopt this document.
- Define Pass/Fail limits for the analytical testing of hazardous substances in wastewater discharges and sludges produced during wastewater treatment operations. This Pass/Fail approach will apply to the ZDHC MRSL parameter: alkylphenol ethoxylates (APEOs) only.

1. Scope

This document applies to process-related discharged wastewater and sludge associated with the production of Man-Made Cellulosic Fibres from different feedstock sources, such as, but not limited to, wood and bamboo.

The fibres within the scope are:

- Viscose Staple Fibres
- Modal Staple Fibres

Testing and reporting of the below listed can be conducted against this document. It has to be observed that the limit values of this document were created for Viscose and Modal Staple Fibres only and that higher results can be reported, for the below listed fibres or production process. The reported data will be collected to help define its limit values[a].

- Viscose Filament Yarn
- Modal Filament Yarn
- Viscose and Modal produced in vertically integrated facilities where wastewater from the fibre production process is mixed with wastewater from dissolving pulp process.

Facilities with vertically integrated production including dyeing or finishing processes should also apply the most current ZDHC MRSL. Wastewater testing of such facilities shall include all the MRSL parameters listed in the ZDHC Wastewater Guidelines.

[a] Data collection purposes: In order to add Viscose and Modal filament yarn and dissolving of pulp for MMCF to the scope of this document the limit values will require collection of additional wastewater testing data and additional time for analysis.

2. Requirements

2.1. Minimum Requirements

The minimum requirements of this document are directly linked to the minimum requirements of the ZDHC Wastewater Guidelines. To learn more about the minimum requirements in the ZDHC Wastewater Guidelines click here.

2.2. Parameters and Limits

2.2.1 Wastewater Parameters

a. Conventional parameters

These parameters, their limits (foundational, progressive and aspirational), and recommended standard test methods for analysis are defined in Appendix A Tables 1.A (Conventional Parameters)

b. Additional parameters

These parameters, their limits (foundational, progressive and aspirational), and recommended standard test methods for analysis are defined in Appendix A Tables 1.B (Additional Parameters). In this appendix the applicable parameter and reporting limit of the ZDHC MRSL can be found.

c. Parameters specific to Man-Made Cellulosic Fibre production process

These parameters, their limits (foundational, progressive and aspirational), and recommended standard test methods for analysis are defined in Appendix A Tables 1.C (Parameters Specific to MMCF Production – Viscose staple fibre and Modal).

Where local legislation and/or permits, cover conventional parameters that are additional to those listed in this document, manufacturing facilities are expected to test for those additional parameters. These should be conducted according to the requirements applicable to local law (legal discharge permit) and the timeline identified by local authorities.

2.2.2 Sludge Parameters

Existing local legal regulations for the treatment and handling of industrial wastewater sludge shall be observed. If no such legal regulations exist, manufacturing facilities should implement disposal recommendations given in this guideline.

In order to manage the remaining sludge from the manufacturing processes of MMCF, it is necessary to test the sludge for the content of potentially harmful substances it contains.

The parameters suggested for testing to support decision-making on disposal can be found in Appendix A, Table 2.

In cases where the sludge from the wastewater treatment process is treated on the premises of the fibre producer, or it is incinerated in a designated incineration facility the testing of the proposed parameters should not apply. Wastewater sludge should be only incinerated by facilities with proof of long-term contract and holding proper technologies and permits.

Disposal recommendations:

- The incineration of Wastewater treatment sludge reduces the volume of the material to be disposed. It also destroys pathogens, decomposes most organic chemicals, and recovers the small amount of heat value contained in sewage sludge. Incineration is a pretreatment process to get residual ash that has just 10-20% of the original sludges' volume. It should also be considered that incineration also releases CO_2 and possibly other pollutants (cadmium, mercury, lead, dioxins) into the atmosphere. That incineration requires sophisticated systems to remove fine particulate matter (fly ash) and volatile pollutants from stack gasses. Therefore, wastewater sludge should be only incinerated by facilities holding proper technologies and permits.
- In cases where no proper incineration is available, wastewater sludge arising from production should only be disposed of at a secured landfill. It shall not be used for any kind of agricultural purpose, in case the below mentioned limit values are exceeded.
- The wastewater sludge from fibre processes might not be suitable for agricultural use due to its concentration of the mentioned pollutants. It might, however, be worthwhile testing the sludge for its contaminants in order to identify other sustainable usage options aligned with a circular approach and to follow best available practices.

2.3. General Principles for Sampling, Testing and Reporting

The general principles for sampling, testing and reporting of this document are directly linked to the latest version published in the ZDHC Wastewater Guidelines. To learn more click here.

2.4. Sampling Requirements

The sampling requirements of this document are directly linked to latest version published in the ZDHC Wastewater Guidelines. To learn more click here.

2.5. Testing Requirements

The testing requirements of this document are directly linked to the latest version published in the ZDHC Wastewater Guidelines. To learn more click here.

2.6. Methods for Analysis/Testing

The methods for analysis/testing recommended in this document are based on internationally-recognised standard water and wastewater testing methodologies, as well as government-recognised testing requirements in the European Union, the United States of America, China, and India.

Other requirements for the methods of analysis/testing of the conventional, additional and specific parameters for wastewater as mentioned in this document are directly linked to the methods for analysis/testing the conventional parameters for wastewater in the ZDHC Wastewater Guidelines. To learn more click here.

A. Conventional Parameters for Wastewater

Recommended standard methods for analysing these parameters are specified in Appendix A Tables 1.A.

B. Additional Parameters for Wastewater

Recommended standard methods for analysing these parameters are specified in Appendix A Tables 1.B.

C. Parameters specific to the Man-Made Cellulosic Fibre production process

Recommended standard methods for analysing these parameters are specified in Appendix A Tables 1.C.

D. Sludge

Recommended standard methods for analysing these parameters are specified in Appendix A Tables 2.

3. Testing and Reporting by ZDHC Accepted Laboratories

The sampling, testing, and reporting by ZDHC Accepted Laboratories of this document is directly linked to the testing requirements of the ZDHC Wastewater Guidelines.
To learn more click here.

3.1. Minimum Frequency for Sampling, Testing and Reporting

The minimum frequency for sampling, testing, and reporting of this document is directly linked to the minimum frequency for sampling, testing, and reporting of the ZDHC Wastewater Guidelines.
To learn more click here.

4. Data Reporting in the ZDHC Gateway – Wastewater Module Platform

The data reporting in the ZDHC Gateway – Wastewater Module Platform should follow the ZDHC Wastewater Guidelines.
To learn more click here.

5. Determining Conformance to this document

Sampling, testing and reporting requirements are the same for manufacturing facilities whether they discharge wastewater directly or indirectly. The only difference is what the resulting concentration data is compared to in order to determine conformance with this document.

Manufacturing facilities with direct discharge are expected to have:

- Achieved the foundational limits for conventional, additional, and specific parameters for the MMCF production process, set forth in Appendix A Table 1.A-1.C.

AND

- The applicable ZDHC MRSL wastewater parameter for discharged wastewater and in either sludge[a] **OR** in raw wastewater[a] to be at concentrations which are at, or below the reporting limits set forth in Appendix A Table 1.B for wastewater.

Manufacturing facilities with indirect discharge are expected to have:

- All conventional parameters complying with their agreements with the receiving central effluent treatment plant (CETP)

AND

- Applicable ZDHC MRSL Wastewater parameter in discharged wastewater and in either sludge[a] OR in raw wastewater[a] to be at concentrations that are at or below the reporting limits set forth in Appendix A Tables 1.B for wastewater.

[a] Option 1 and Option 2 can be found in the ZDHC Wastewater Guidelines, Appendix B.

6. Resolution of Non-Conformances

A. Definition of Non-Conformance

After testing is completed the test results may indicate non-conformance, which is defined below.

- For Wastewater Conventional, Additional, and Specific parameters for the MMCF production process. This is when test results:
  - Either exceed the foundational limits set forth in this document (Appendix A Tables 1.A-1.C) for direct discharge.
  - Or exceed the foundational limits of receiving CETP's requirements for indirect discharge manufacturing facilities.
- For the MMCF parameters applicable in the ZDHC MRSL Wastewater Parameter (APEOs): This is when test results exceed the reporting limits set forth in this document (Appendix A Tables 1.B).

B. Expectations for Manufacturing facilities with Non-Conformance(s)

If a test report indicates non-conformance as defined above, the supplier is expected to:

- Develop a root cause analysis and corrective action plan with a defined completion date. An input stream management review can be part of the initial root cause analysis, with actions such as checking if chemical formulations used in the production processes conform to the ZDHC MRSL; sending out specifications to textile raw material manufacturing facilities; or checking chemicals used in non-production related areas (e.g. APEOs used in cleaning products.)
- Submit the root cause analysis and corrective action plan with defined completion date on the ZDHC Gateway – Wastewater Module. Submission is expected to happen within thirty (30) days from the date of the laboratory report.
- Manufacturing facilities are encouraged to use the ZDHC Root Cause Analysis and Corrective Action Plan templates available in the ZDHC Gateway.
- Manufacturing facilities may resolve non-compliances and non-conformances in ways they deem best. For instance, they could contact clients (i.e. brands/retailers) to see if they can offer any advice; or reach out to technical experts to help determine the root cause and identify suitable solutions.

7. Expectations

The expectations of this document should follow the ZDHC Wastewater Guidelines. To learn more, click here.

a. Manufacturing facilities that directly discharge their wastewater into the environment are expected at minimum, to achieve the foundational limits of the conventional, additional and specific wastewater parameters (Appendix A, from Table 1A to1C).

b. Manufacturing facilities are encouraged to proactively develop and manage a written, data-driven plan to continuously improve their operations. This includes meeting the foundational limits of the conventional wastewater parameters and striving for achievement of progressive and aspirational limits.

c. Manufacturing facilities testing as per this document must demonstrate, that the concentration of applicable ZDHC MRSL parameters (APEOs - Appendix A, Table 1.B for wastewater) are below reporting limits

Appendix A
Parameters and Limit Values

Table 1.A Conventional Parameters limit values and test methods

Conventional Wastewater Parameters								
	Unit	Limit values			Test methods			
		Foundational	Progressive	Aspirational	International/ Europe	USA	China	India
PH	pH Units	6 - 9			ISO 10523	USEPA 150.1 SM 4500H^+-B	GB/T 6920	IS 3025 (Part 11)
Temp	°C	Δ15	Δ10	Δ5	N/A	USEPA 170.1 SM 2550-B	GB/T 13195	IS 3025 (Part 9)
Colour	{m-1] (436nm; 525; 620nm)	7; 5; 3	5; 3; 2	2; 1; 1	ISO 7887-B	N/A	N/A	IS 3025 (Part 4)
COD discharge to Sea	mg/L	150	100	60	ISO 15705 (in case deviating results then ISO 6060)	USEPA 410.4. SM 5220D**	HJ 828	IS 3025 (Part 58)
COD discharge to other bodies of water	mg/L	120	100	60				
BOD - 5-day Concentration	mg/L	30	15	5	EN 1899-1 ISO 5815-1	USEPA 405.1, SM 5210B	HJ 505	IS 3035 (Part 44) (BOD5)
Oil & Grease	mg/L	8	5	2	ISO 9377-1	USEPA 1664-B SM 5520-B or C	HJ 637	IS 3025 (Part 39) Infrared partition method
Total-N	mg/L	30	25	20	ISO 29441,11905	SM 4500N-C 4500N-B	HJ 636	IS 3025 (Part 34)
NH_4-N	mg/L	5	3	1	ISO, 6778, 11732, 5664	SM 4500NH3-C or D	HJ 665, HJ 666, HJ 535, HJ 536	IS 3025 (Part 34)
TSS	mg/L	70	50	30	ISO 11923	USEPA 160.2, SM 2540D	GB/T 11901	IS 3025 (Part 17)
Total-P	mg/L	3	1	0.5	ISO 6878, ISO 11885 (ICP-OES), ISO 17294-2 (ICP-MS)	USEPA 365.4, SM 4500P-J EPA 200.7 (ICP-OES), EPA 200.8 (ICP-MS)	GB/T 11893 HJ 700 (ICP-MS) HJ 670, HJ 671	IS 3025 (Part 31) IS 3025 part 65 (ICP-MS)
AOX	mg/L	5	2	0.2	ISO 9562	USEPA 1650	HJ/T 83-2001	CPPRI Saharanpur, AOX Analyzer, ISO 9562
Phenols	mg/L	1	0.5	0.1	ISO 14402 ISO 6439 [Chloroform extraction]	SM 5530 B, C&D	HJ 503	IS 3025 (Part 43)

Conventional Wastewater Parameters (continued)								
	Unit	Limit values			Test methods			
		Foundational	Progressive	Aspirational	International/ Europe	USA	China	India
Toxicity[a] • Luminous Bacteria or • Fish egg test or • Daphne or • Algae (Toxicity is an optional parameter and results from this test should be considered as informational.)	GI GE GD GAL	32 2 12 16			Fish egg test, Daphne and/or Algae test: DIN EN ISO 11348-2: 1999-04 (L 34-2) DIN EN ISO 11348-2: 2009-05 (L 52) DIN EN ISO 11348-1: 2009-05 (L 51)	SM 8050-B	N/A	N/A

[a] The data collection of Toxicity will be used to understand the wastewater content, which might result in a further review of this table.

Table 1.B Additional Parameters limit values and test methods

Additional Wastewater Parameters								
	Unit	Limit values			Test methods			
		Foundational	Progressive	Aspirational	International/ Europe	USA	China	India
Chromium, total	mg/L	0.2	0.1	0.05	ISO 11885, ICP-OES, ISO 17294-2 ICP-MS	USEPA 200.7. USEPA 200.8.	GB 7466, HJ700	IS 3025 (Part 52)
Cadmium[a]		0.1	0.05	0.01	ISO 11885, ICP-OES, ISO 17294-2 ICP-MS	USEPA 200.7. USEPA 200.8.	GB7475, HJ700	IS 3025 part 41, AAS, Instrumental Method
Copper[a]		1	0.5	0.25	ISO 11885, CP-OES, ISO 17294-2 ICP-MS	USEPA 200.7. USEPA 200.8.	GB7475. HJ700	IS 3025 part 42, AAS, Instrumental Method
Nickel[a]		0.5	0.2	0.1	ISO 11885, ICP-OES, ISO 17294-2 ICP-MS	USEPA 200.7. USEPA 200.8.	GB 11907. HJ700	IS 3025 part 54, AAS, Instrumental Method
Chromium (VI)		0.05	0.005	0.001	ISO 18412	USEPA 218.6	GB 7467	IS 3025 part 52
Lead[a]		0.1	0.05	0.01	ISO 11885, ICP-OES, ISO 17294-2 ICP-MS	USEPA 200.7. USEPA 200.8.	GB7475. HJ700	IS 3025 part 47 AAS, Instrumental Method
Mercury		0.01	0.005	0.001	ISO 12846 or ISO 17852, ISO 17294-2 (ICP-MS)	USEPA 245.1, 245.2, EPA 200.8 (ICP-MS)	HJ 597, HJ 700	IS 3025 (Part 48) IS 3025 part 65 [SIM mode]
Σ Hydrocarbons		5	3	1	-	USEPA 1664 B SM 5520-F	-	-
	Unit	**Reporting limit**			**Test methods**			
APEOs	µg/L	5.0			NP/OP: ISO 18857 -2 (modified dichloromethane extraction) or ASTM D7065 (GC/MS or LC/MS(-MS) OPEO/NPEO (n>2): ISO 18254-1 OPEO/NPEO (n=1,2): ISO 18857-2 or ASTM D7065			

[a] These parameters will be reviewed once sufficient data is gathered, in order to make a decision with a science-based approach.

Table 1.C Specific Parameters related to MMCF production limit values and test methods

Parameters Specific to the production of Viscose and Modal (staple fibre)								
	Unit	Limit values			Test methods			
		Foundational	Progressive	Aspirational	International/ Europe	USA	China	India
Zn	mg/L	2.5	1.0	0.5	ISO 11885 ICP-OES ISO 17294-2 ICP-MS	USEPA 200.7. USEPA 200.8.	GB 7475. HJ 700	IS 3025 part 49 AAS, Instrumental Method
Sulphide	mg/L	2	1	0.5	ISO 10530	SM 4500S^2-C&D 4500S^2-G	GB/T 16489 HJ 824 (flow injection methylene blue)	IS 3025 part 29
CS_2		0.5	0.2	0.1	ISO 15680 ISO 11423-2 (headspace method)	USEPA 8260B	HJ 810, GB/T 15504 (headspace method)	N/A

Table 2 Parameters for sludge testing and test methods[a]

Substance or Substance Group	Unit	Reporting limit	Test methods			
			International/ Europe	USA	China	India
AOX - Leachate	mg/kg	10	DIN 38414 S18: 2019	US EPA 1650	HJ/T 83:2001 ISO 9562:2004	IS 3025 Part 70
EOX[b] - Dry sludge[c]		0.2	DIN 38414-S 17, 2017-01	US EPA 9023	-	-
TOC[d] - %		1000	DIN EN 15936: 2012-11	US EPA 9060	HJ 695:2014 HJ 658:2013 HJ 615:2011	IS 2720 Part 22 IS 3025 Part 69
Heavy metals - Zn Cu Ni Pb Cd Hg		1	DIN EN ISO 17294-2: 2017-01 Acid Digestion, ICP or ICP/MS	US EPA 200.8 US EPA 3050	HJ 832:2017 HJ 803:2016 CJ/T221-2005 HJ 781:2016 HJ 766:2015	IS 3025 Part 2, 65, 66

[a] The data collection for these parameters will be used in future to understand the sludge content. This might result in a further review of this table.

[b] If EOX results are positive, then AOX shall be tested.

[c] Dry sludge: Either partially dried (60% to 80% DS) or completely dried, up to approx. 80% to 90% DS. The percentage of the DS has to be included in the final calculation.

[d] This parameter should be considered in those facilities where sludge from the MMCF facility is connected to other type of facility.

Relevant Organisations and Contributions

- Canopy click here
- Bluesign System click here
- The European IPPC Bureau (EU-BAT BREF Reference Document on Best Available Techniques in the Production of Polymers August 2007) click here
- The Collaboration for Sustainable Development of Viscose (CV) click here
- EU Eco Label click here
- World Health Organization – Making Water a Part of Economic Development click here
- ZDHC Roadmap to Zero Programme click here

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End Notes

i EUROPEAN COMMISSION - Reference Document on Best Available Techniques in the Production of Polymers August 2007