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- The ZDHC Foundation has prepared this document to support environmental stewardship initiatives. This document is not intended as a statement of legal requirements.

- The ZDHC Foundation makes no warranty, expressed or implied, concerning the contents of this document and assumes no legal responsibility for those contents.

- Manufacturing facilities are required to be consistently compliant with the applicable legal requirements and permits issued by the authorities having jurisdiction over individual manufacturing facilities. Where stricter legal, local or regional wastewater limits are in place, those limit values shall supersede the limit values as set forth in this document.

- 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

<table>
<thead>
<tr>
<th>Version Number</th>
<th>Changes</th>
<th>Time of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 1.0</td>
<td>Initial publication of the ZDHC Man-Made Cellulosic Fibres Production Wastewater Guidelines</td>
<td>2020</td>
</tr>
</tbody>
</table>

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 Effluent Treatment 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/Tujiàn, (Chinese recommended national standard)
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

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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*. 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.

* 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 (CS₂) (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*. 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 (EUROPEAN COMMISSION - IPPC Bureau 2007).

* Textile exchange – Preferred Fibre & Materials.
The scope expansion plan of this document includes the outputs proceeding from the dissolving pulp for MMCF fibres, and other fibres including but not limited to:

- Viscose Filament Yarn\textsuperscript{a}
- Modal Filament Yarn\textsuperscript{a}
- Lyocell\textsuperscript{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\textsuperscript{b}**: An 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.

\textsuperscript{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.

\textsuperscript{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*.

- 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.

* 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\textsubscript{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\textsuperscript{a} OR in raw wastewater\textsuperscript{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\textsuperscript{a} OR in raw wastewater\textsuperscript{a} to be at concentrations that are at or below the reporting limits set forth in Appendix A Tables 1.B for wastewater.

\textsuperscript{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 CETPs 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.

- 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).
- 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.
- 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.
### Table 1.A Conventional Parameters limit values and test methods

<table>
<thead>
<tr>
<th>Conventional Wastewater Parameters</th>
<th>Unit</th>
<th>Limit values</th>
<th>Test methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Foundational</td>
<td>Progressive</td>
</tr>
<tr>
<td>PH</td>
<td>pH Units</td>
<td>6 - 9</td>
<td></td>
</tr>
<tr>
<td>Temp</td>
<td>°C</td>
<td>Δ15</td>
<td>Δ10</td>
</tr>
<tr>
<td>Colour (m-1) (436nm; 525; 620nm)</td>
<td></td>
<td>7; 5; 3</td>
<td>5; 3; 2</td>
</tr>
<tr>
<td>COD discharge to Sea mg/L</td>
<td>150</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>COD discharge to other bodies of water mg/L</td>
<td>120</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>BOD - 5-day Concentration mg/L</td>
<td>30</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Oil &amp; Grease mg/L</td>
<td>8</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Total-N mg/L</td>
<td>30</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>NH₄-N mg/L</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>TSS mg/L</td>
<td>70</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>Total-P mg/L</td>
<td>3</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>AOX mg/L</td>
<td>5</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>Phenols mg/L</td>
<td>1</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Unit</td>
<td>Limit values</td>
<td>Test methods</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Foundational</td>
<td>Progressive</td>
<td>Aspirational</td>
</tr>
<tr>
<td>GI</td>
<td>32</td>
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<td>GE</td>
<td>2</td>
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<td></td>
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<td>GD</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAL</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Toxicity: 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.

* 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

<table>
<thead>
<tr>
<th>Additional Wastewater Parameters</th>
<th>Unit</th>
<th>Limit values</th>
<th>Test methods</th>
<th>USA</th>
<th>China</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Foundational</td>
<td>Progressive</td>
<td>Aspirational</td>
<td>International/ Europe</td>
<td></td>
</tr>
<tr>
<td>Chromium, total</td>
<td>mg/L</td>
<td>0.2</td>
<td>0.1</td>
<td>0.05</td>
<td>ISO 11885, ICP-OES, ISO 17294-2 ICP-MS</td>
<td>USEPA 200.7, USEPA 200.8</td>
</tr>
<tr>
<td>Cadmium&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>0.1</td>
<td>0.05</td>
<td>0.01</td>
<td>ISO 11885, ICP-OES, ISO 17294-2 ICP-MS</td>
<td>USEPA 200.7, USEPA 200.8</td>
</tr>
<tr>
<td>Copper&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>ISO 11885, CP-OES, ISO 17294-2 ICP-MS</td>
<td>USEPA 200.7, USEPA 200.8</td>
</tr>
<tr>
<td>Nickel&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td>ISO 11885, ICP-OES, ISO 17294-2 ICP-MS</td>
<td>USEPA 200.7, USEPA 200.8</td>
</tr>
<tr>
<td>Chromium (VI)</td>
<td></td>
<td>0.05</td>
<td>0.005</td>
<td>0.001</td>
<td>ISO 18412</td>
<td>USEPA 218.6</td>
</tr>
<tr>
<td>Lead&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>0.1</td>
<td>0.05</td>
<td>0.01</td>
<td>ISO 11885, ICP-OES, ISO 17294-2 ICP-MS</td>
<td>USEPA 200.7, USEPA 200.8</td>
</tr>
<tr>
<td>Mercury</td>
<td></td>
<td>0.01</td>
<td>0.005</td>
<td>0.001</td>
<td>ISO 12846 or ISO 17852, ISO 17294-2 (ICP-MS)</td>
<td>USEPA 245.1, 245.2, EPA 200.8 (ICP-MS)</td>
</tr>
<tr>
<td>Σ Hydrocarbons</td>
<td></td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>USEPA 1664 B SM 5520-F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Reporting limit</th>
<th>Test methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>APEOs</td>
<td>µg/L</td>
<td>5.0</td>
</tr>
</tbody>
</table>

<sup>a</sup> 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

<table>
<thead>
<tr>
<th>Parameters Specific to the production of Viscose and Modal (staple fibre)</th>
<th>Unit</th>
<th>Limit values</th>
<th>Test methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Foundational</td>
<td>Progressive</td>
</tr>
<tr>
<td>Zn</td>
<td>mg/L</td>
<td>2.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Sulphide</td>
<td>mg/L</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>CS₂</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

### Table 2 Parameters for sludge testing and test methods

<table>
<thead>
<tr>
<th>Substance or Substance Group</th>
<th>Unit</th>
<th>Reporting limit</th>
<th>Test methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>DIN 38414-5 17, 2017-01</td>
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<tr>
<td>Cu</td>
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<td>Ni</td>
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<td>Hg</td>
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</table>

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* 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.

* If EOX results are positive, then AOX shall be tested.

* 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.

* 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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- Dr. Siva Pariti, Sustainable Textile Solutions (STS)
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- Zheng Luo, Lenzing Group

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End Notes

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