Environmental Guidelines

G-Star RAW C.V.

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1. Introduction

1.1. Background

At G-Star RAW C.V. ('G-Star' hereafter), we are committed to producing high quality and ethically manufactured products at a good value to our consumers. As G-Star does not own or operate any factories, we work together with skillful suppliers that share our passion to make a strong product.

We believe it is our responsibility to take leadership within the industry and continuously experiment and develop new sustainable design innovations using denim as our canvas. When we design, we design for the future; not only in how our products look, but also the wider impact they have. If we still want to be here as a denim brand in 20, 50 or even 100 years from now, it is crucial for us to think innovatively about the impact we have on people and the planet.

For G-Star, this means future-proofing denim by investing in sustainable innovation and incorporating it in everything we do. We focus on a circular approach to how denim is made and used by our customer to create tomorrow's classics: quality denim of the future with respect for people and the planet in a transparent manner.

1.2. Purpose of the Environmental Guidelines

In the G-Star RAW Supplier Code of Conduct (CoC), we have listed the minimum social and environmental standards we expect our suppliers to meet. Meeting G-Star's minimum requirements is a precondition to do business with G-Star. On top of that, we expect suppliers to continuously improve their environmental and social performance. The G-Star RAW Supplier Code of Conduct is shared with all G-Star's suppliers and is accessible online in multiple languages here.

This Environmental Guideline document complements the G-Star RAW Supplier Code of Conduct. The objectives of the Environmental Guidelines are to provide for each of the environmental topics listed in the Supplier Code of Conduct[1]:

- Guidance on the minimum environmental requirements set out by G-Star and how to achieve them;
- A high-level overview of environmental good practices that are available to voluntarily drive environmental improvements and aspirational level of performance beyond G-Star's minimum requirements.

The Environmental Guidelines is a freely accessible document and is intended for to all G-Star suppliers, subcontractors and other business partners involved in the purchasing, manufacturing and finishing processes of products commercialized by G-Star and any of G-Star affiliated companies.

1.3. Minimum Requirements and Aspirational Level of Performance

This document follows the outline and sequence of the Code of Conduct and lists per environmental topic guidance on 1) the minimum requirements and 2) aspirational levels of performance respectively.

At a strict minimum, all suppliers, their sub-contractors and other business partners must follow the national laws in all their activities in the countries in which they operate, and comply with the standards defined by G-Star in the G-Star RAW Supplier Code of Conduct. It is the responsibility of the individual supplier to ensure they meet all legal requirements and obtain necessary approval, permissions and compliances related to the environmental impact of their operations. Should there be any differences between the requirements set out by applicable laws

[1] Note that G-Star also prepared Social and Labor Guidelines to provide suppliers with guidance on meeting G-Star's social and labor expectations. The Social and Labor Guidelines are also available online. For questions, contact cr@g-star.com.

and regulations and by G-Star, the more stringent requirements shall apply. If G-Star's expectations were to conflict with applicable laws and regulations, the supplier must notify G-Star immediately.

G-Star encourages suppliers to explore and implement good and best practices on environmental stewardship, both within their operations and beyond, by engaging their own suppliers and business partners on improving environmental practices, to drive sustainability across our value chain.

Key terms	Definition	Wording formulation
Minimum requirements	Minimum environmental standards we expect each facility to meet in order to do business with G-Star	Assertive words such as *'Supplier shall', 'Supplier must', 'G-Star expects supplier to…'* will be used to describe minimum requirements
Aspirational level of performance	Good and best practices to demonstrate innovation and leadership in the industry on environmental stewardship	Suggestive expressions such as *'Supplier should'* / *'It is recommended that'* will be used to describe aspirational level of performance

2. Implementation, Compliance and Continuous Improvement Monitoring

2.1. Overview

G-Star expects all suppliers to meet the minimum requirements as listed in the G-Star Supplier Code of Conduct at all times, by implementing the guidelines listed in this document in daily practices and procedures on the factory floor. G-Star will verify suppliers' compliance with the requirements by using the following set of tools:

- Higg Index Facility Environmental Module (FEM);
- ZDHC InCheck & ClearStream reports (more information in Section 4 'Chemical Management' and Section 5 'Wastewater management); and
- G-Star RAW Materials Policy (more information provided in Section 7 'Sustainable Raw Materials').

2.1.1. Continuous improvement

Since the above-mentioned tools are focused on continuous environmental performance improvement instead of compliance only, working towards good and best practices (aspirational performance listed in this document) will result in higher scores on the respective tools. By using these tool G-Star encourages its suppliers to continuously assess their environmental performance and make necessary improvements over time.

To allow for a well-functioning monitoring mechanism, suppliers must permit audits at any time of all the factories involved in the manufacturing of G-Star products by G-Star employees and/or accredited auditors. As part of the monitoring process, accredited auditors must be allowed to conduct interviews with workers on a confidential basis and to inspect the supplier's premises.

2.1.2. Supplier requirements

Suppliers are required to:

- Post and share a Higg FEM 3.0 self-assessment (deadline 30th of April) and verification (deadline 31st of August) annually.

- Post ZDHC InCheck (at least once yearly) and ClearStream (deadline 30th of April) reports. This is applicable to wet processing facilities[2] only.

Additional Resources

- Higg.org portal[3];
- Higg FEM How to Higg Guide;
- ZDHC Gateway[4];

3. Soil, Water and Air Pollution

3.1. Introduction

As a start towards measuring environmental performance, suppliers should be aware of the (potential) impacts its business, processes and products have on the environment. An (environmental) risk/impact assessment that takes into account potential soil, water and air pollution is a first step towards taking responsibility of the environmental performance of your facility. Having a mature and well-functioning Environmental Management System in place guarantees suppliers can anticipate, prevent and mitigate harmful environmental risks/impact and continuously improve environmental performance.

3.2. Minimum Requirements

In order to do business with G-Star, suppliers must:

- Have all necessary permits and/or report its impacts to the relevant authorities as required by law; and
- Investigate risks associated with and opportunities to reduce soil, water and air pollution.
- Identify and monitor potential pollutants that might cause contamination of soil, ground water and/or air, including but not limited to:
  - *Air emissions:* Air emissions can occur from a wide spectrum of industrial activities such as stack emissions, power generation/boiler house or from production processes like application of solvents in production lines;
  - *Soil contamination*: Sources of contamination may be due historic activities of production facilities or due to recent activities, which may include accidents or poor handling and storage of hazardous chemicals or waste. Contamination of land is of high concern as it is a direct and serious risk to human health and the environment; and
  - *Water quality*: more information provided in Section 5 'Wastewater Management'.

Additional resources

- Higg FEM How to Higg Guide;
- Higg FEM Regulatory & Permit Tracking Template;
- World Health Organization (WHO) Air Quality Guidelines;
- Chinese Ambient Air Quality Standards GB 3095-2012 (in Chinese).

[2] Manufacturing processes that use water as fluid that contacts the product being manufactured. For example, dyeing, finishing, printing, washing, and laundry processes. Non-contact, closed-loop boiler or cooling water are not considered wet processing.
[3] The Higg.org Portal is the online platform to purchase, post and share Higg Facility Modules (FEM + FSLM). Suppliers must register to receive login details.
[4] The ZDHC Gateway is the online platform to search ZDHC MRSL conformant chemical products, develop MRSL conformant Chemical Inventory List, and post wastewater testing reports according to ZDHC Wastewater Guidelines. Suppliers can get access to the platform by invitation of G-Star (or any other ZDHC signatory brand) only. Please contact CR@g-star.com.

3.3. Aspirational Level of Performance

Although establishing an Environmental Management System (EMS) is not a G-Star minimum requirement as listed in the Code of Conduct (CoC), it is highly recommended to do so as it provides a standardized framework for a facility to manage environmental minimum requirements on the individual sections/topics as outlined in the CoC and Environmental Guidelines. An EMS is a holistic strategy and process to identify, track and manage the environmental impacts of a facility over time.

An EMS typically follows the Plan–Do–Check–Act four-step model[5]:

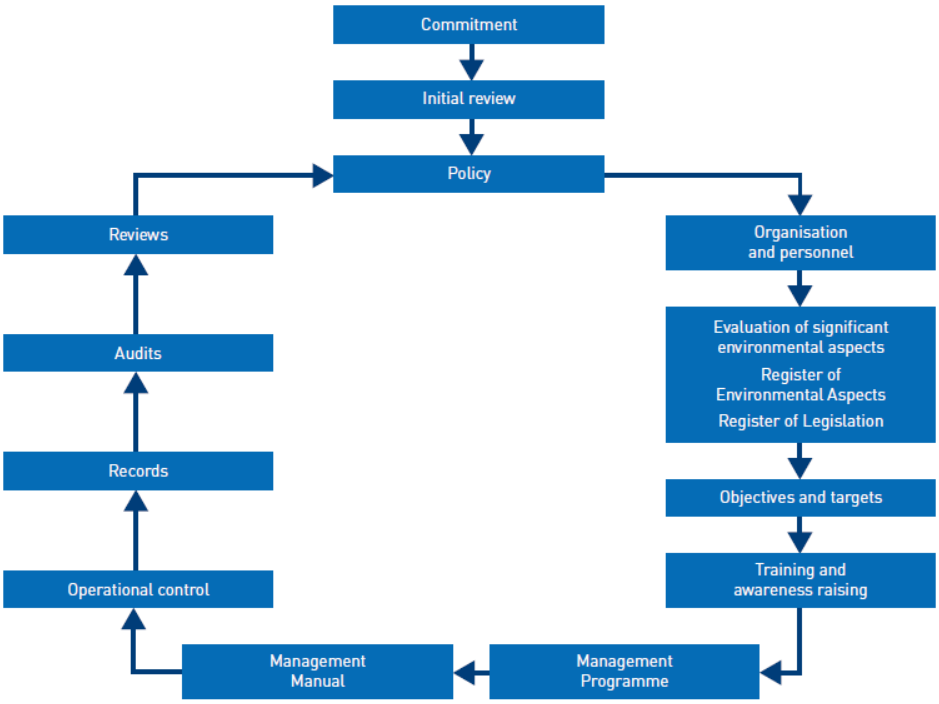
- **Plan:** Establish the objectives and processes necessary to deliver results in accordance with the facility's environmental policy;
- **Do:** Implement the processes;
- **Check**: Monitor and measure processes against environmental policy, objectives, targets, legal and other requirements, and report the results; and
- **Act:** Take actions to continually improve performance of the EMS.

An effective EMS should cover the following aspects which are summarized in the visual below[6]:

- Assessment of how a facility's activities, products and processes might affect the environment;
- Environmental policy;
- Environmental improvement program;
- Defined roles and responsibilities for all employees;
- Training and awareness program;
- Written procedures to control activities with a significant environmental impact;
- Controlled system of records;
- Periodic auditing to ensure effective operation; and
- Formal review by senior management.

[5] Source: ISO 14001:2004(E) Standard: Environmental Management Systems – Requirements with guidance for use.
[6] Source: WRAP Guide to Environmental Management System.

Elements of a typical EMS



Several certification standards are available in the marketplace, including ISO14001, to verify and enhance the credibility of your EMS.

Additional resources

- Higg FEM How to Higg Guide;
- WRAP: Your Guide to EMS;
- Introduction to ISO 14001:2015 verification standard;
- ISO 14001: identifying and evaluating environmental aspects; and
- ISO templates and support package, Hong Kong Environmental Protection Department (EPD).

4. Chemicals Management

4.1. Introduction

The use of chemicals in a facility's production processes and operations can be extremely toxic and hazardous to the environment and human health if not managed systematically and appropriately. G-Star is a member of the Zero Discharge of Hazardous Chemicals (ZDHC) Foundation, with the mission to advance towards zero discharge of hazardous chemicals in the textile, leather and footwear value chain and to act towards minimizing the impact of the value to the environment and people's wellbeing.

This section is broken down into the following sub-sections: i) minimum requirements; and ii) aspirational level of performance. Note that, although developing a Chemicals Management System (CMS) is covered in section ii), a CMS can support facilities to address the minimum requirements from G-Star on chemicals management by developing a holistic framework to manage chemicals in a safe and responsible manner.

4.2. Minimum Requirements

4.2.1. Overview

As a strict minimum to do business with G-Star, as per G-Star Code of Conduct, all suppliers must ensure that they:

- Clearly mark and store hazardous substances in dedicated storage areas;
- Have appropriate and operable protective safety equipment and hazard signage in all areas where chemicals are stored and used;
- Make Safety Data Sheets available to employees for all chemicals (in the local language) in the workshop and storage areas;
- Have a chemical spill and emergency response plan that is practiced periodically;
- Provide training to all employees who use chemicals on chemical hazards, risk, proper handling, and what to do in case of emergency or spill;
- Comply with G-Star's Restricted Substances List (RSL) and Manufacturing Restricted Substances List (MRSL) and stay informed of version updates.

4.2.2. Basic Chemicals Management and Occupational Health and Safety Practices

As a general rule (and in alignment with our Supplier Code of Conduct), suppliers must[7]:

- Provide a safe working environment to their employees and ensure minimum conditions of light, ventilation and hygiene, fire prevention and safety measures, among others; and
- Take necessary steps to prevent accidents and injury to health arising out of, linked with, occurring in the course of work and/or because of the operations of suppliers' facilities.

4.2.2.1. *Chemical Labelling, Handling and Storage*

Suppliers must clearly mark and store hazardous substances in dedicated storage areas and display hazard signage in all areas where chemicals are stored and used. This includes:

- *Classification and labelling of chemicals* in accordance with the United Nations'[8] - for more information on GHS / CLP hazard labelling and classification, please refer to Appendix 1;
- *Chemical handling*: documentation on precautions for safe handling shall be available for personnel working with hazardous chemicals as part of the Safety Data Sheet (c.f. 4.2.2.2); and
- *Chemical storage:* documentation shall be provided to personnel working with hazardous chemicals on safe and appropriate storage conditions as part of the Safety Data Sheet (c.f. 4.2.2.2), including details on storage conditions and requirements for storage rooms and vessels.

4.2.2.2. *Safety Data Sheet (SDS) Management*

Suppliers must make Safety Data Sheets available to employees for all chemicals (in the local language) in the workshop and storage areas. SDSs include information such as:

- The properties of a given substance (also called formulation or mixture);
- Its hazards and instructions for handling, disposal and transport;
- First-aid, fire-fighting and exposure control measures.

[7] Note that this section focuses exclusively on potential hazards occurring from exposure to chemicals. For Occupational Health and Safety (OHS) requirements outside of this scope, kindly refer to our 'Supplier Code of Conduct' and 'Social and Labor Guidelines'. The actions outlined in the remainder of the section must be taken by suppliers at the facility-level to ensure the safety of workers and proper management of chemicals

[8] The GHS/CLP standard provides a harmonized basis for globally uniform physical, environmental, and health and safety information on hazardous chemical substances and mixtures.

SDSs must follow the GHS/CLP classification (c.f. 4.2.2.1). For more information on the content of SDSs, please refer to Appendix 2. SDSs can be obtained from chemical suppliers at any time. In case chemical suppliers are unable to deliver a complete SDS for a classified substance, the supplier must discontinue sourcing this substance immediately and find an alternative with a complete SDS.

4.2.2.3. *Personal Protective Equipment (PPE)*

Supplier must have appropriate and operable Personal Protective Equipment in all areas where chemicals are stored and used. Information on appropriate PPE can be found in SDSs provided by the chemical suppliers.

PPE for the use and handling of chemicals is conventionally classified into the following categories:

Category	Examples of PPE	Route of entry	Physical form of chemical
Protective clothing	Aprons, gowns, overalls	Skin contact	Gas/vapour, fumes, aerosol, dust, airborne particulate, liquid, splashes of liquid
Hand protective gear	Gloves		
Foot protective gear	Safety shoes or boots		
Eye and face protective equipment	Safety goggles, face shields with adjustable head harness, hoods		
Respiratory protective equipment	Air-purifying respirators, air-supplied respirators, self-contained respirators	Inhalation	Gas/vapour, fumes, aerosol, dust, airborne particulate

An effective PPE program should ensure that:

- The employees follow instructions as laid down in the in-house safety rules and use the PPE provided to them whenever required;
- The PPE is used only after adequate training has been given to the user;
- The PPE is in good working condition;
- The PPE is properly worn and correctly fitted to the wearer;
- The PPE is properly cleaned and stored after use; and
- The maintenance schedule of the PPE is strictly followed.

For more information on appropriate selection, storage and maintenance of PPE for the use and handling of chemicals, please refer to: Guidance Notes on PPE for Use and Handling of Chemicals.

4.2.2.4. *Chemical Spill and Emergency Response Plan*

Suppliers must have a chemical spill and emergency response plan that is practiced periodically, to demonstrate that employees know how to respond in the case of a chemical emergency, spill or leak. Having a plan can help prevent employees and community casualties as well as possible financial collapse of the organization in the case of a chemical emergency. Time and circumstances in an emergency mean that normal channels of authority and communication cannot be relied upon to function routinely. The stress of the situation can lead to poor judgment resulting in severe losses. Communication, training and periodic drills will ensure adequate performance if the plan must be carried out.

According to the ZDHC Chemical Management System (CMS) Guidance Manual, an Emergency Response Plan should be prepared as a written procedure and include detailed instructions on how to evacuate the building and contain contact names/information for individuals in charge of the evacuation. In addition:

- Primary and secondary escape routes with simple instructions should be posted at significant spots, at entrances and near elevators and telephones;

- Emergency Response Leaders are assigned in each facility. Emergency Response Leaders are responsible for leading any emergency responses, such as evacuations etc. Emergency Response Leaders should be assigned specific duties, such as verifying that all workers have been evacuated;
- Disabled workers and those with a history of certain medical conditions should be assigned an Emergency Response Leader to guide them to safety;
- Stairways should be kept free of materials that could block or hinder an evacuation;
- Regular fire drills should be conducted to identify problems before an actual fire occurs and treated as if they were an actual emergency;
- Important telephone numbers such as emergency, fire department and internal Emergency Response Leaders should be posted close to every telephone;
- An emergency shower and eye wash station for removing chemicals that may contact the skin or eyes should be maintained in the workshop and storage areas; and
- A first aid kit that is clearly marked, easily accessible and protected against dust and water should be provided. The kit should include: i) an inspection tag to document monthly checks, and ii) written first aid instructions in the local language.

The United States Federal Emergency Management Agency (FEMA) developed an Emergency Response Plan Template that suppliers can use as a reference.

4.2.2.5. *Employee Training*

The supplier must provide training to all employees who use chemicals on the proper use and handling of hazardous chemicals. Examples of training topics include:

- Chemical hazards and identification;
- Material Safety Data Sheet
- Proper storage and handling of chemicals;
- Use, storage and maintenance of PPE;
- Emergency response plan and associated procedures in case of emergency, chemical spills or leaks;
- Access restriction to chemical storage areas; and
- Roles and responsibilities.

Additional Resources

- Higg FEM How to Higg Guide;
- ZDHC Chemical Management System (CMS) Guidance Manual;
- ZDHC Academy;
- Designing Safe Working practices for Hazardous Substances, baua Federal Institute for Occupational Safety and Health;
- Globally Harmonized System of Classification and Labelling of Chemicals (GHS/CLP), United Nations;
- Safety Data Sheet (SDS) Template;
- Guidance Notes on Personal Protective Equipment (PPE) for Use and Handling of Chemicals; and
- Emergency Response Plan Template, US Federal Emergency Management Agency (FEMA) .

4.2.3. G-Star Restricted Substances List (RSL)

4.2.3.1. *Overview*

The purpose of G-Star's Restricted Substances List is to inform our suppliers on hazardous substances that are banned or restricted in G-Star finished products. The RSL specifies those chemicals that are restricted and the

maximum limit of residues that can be found on final textile, apparel, accessories and footwear products. Our RSL was developed based on:

- Environmental, health and safety risk assessments;
- Current and anticipated legal requirements of markets where G-Star products are distributed or sold; and
- Industry best practices.

Suppliers shall ensure that they comply with our RSL and communicate our expectations to relevant internal teams, sub-contractors and other organizations involved in the production of G-Star products.

G-Star RSL can be accessed and downloaded online here. The RSL is reviewed and updated on yearly basis.

4.2.3.2. *Product Testing and Compliance Monitoring*

G-Star expects all partners to ensure that all materials and products supplied to G-Star are in full compliance with current laws and regulations regarding product-related harmful substances. Suppliers are responsible to only ship compliant products to G-Star. Suppliers will be held responsible and liable for all loss and damage suffered by G-Star, should any hazardous substance be found in the materials, components or final product.

Based on G-Star's risk assessment, product testing will be regularly carried out to verify effectiveness of each supplier/manufacturer's product testing program. Product testing will only be carried out and accepted from laboratories nominated and approved by G-Star. For further information, please contact our G-Star's Quality Assurance Department at qa@g-star.com

Failures to comply with the requirements set out in G-Star RSL can result in a business review by G-Star and may result in the removal of manufacturers or suppliers from the approved supplier list, as well as a claim of compensation for cost as a consequence of the compliance failure.

Additional Resources

- G-Star Restricted Substances List;
- Higg FEM How to Higg Guide;
- Supplier Chemistry Toolkit, AFIRM Group;

4.2.4. ZDHC Manufacturing Restricted Substances List (MRSL)

4.2.4.1. *Overview*

A MRSL is a list of hazardous chemicals that are restricted above a specified threshold in the manufacturing of textiles, apparel and footwear products. Since 2019 G-Star has aligned its MRSL with the ZDHC MRSL. The intent of the MRSL is to manage the input of chemicals used by the supply chain and remove hazardous substances from the manufacturing processes. While RSL only detects hazardous substances that are present in finished products, MRSL addresses all process chemicals, which may be washed away during the manufacturing process and undetectable in finished products. Therefore, the MRSL mainly targets wet-processing facilities.

All suppliers, their subcontractors and other business partners are responsible to ensure that the wet processing facilities involved in the manufacturing of G-Star products comply with the ZDHC MRSL. G-Star anticipates that suppliers will work closely with their chemicals suppliers to ensure substances mentioned in this MRSL are not present in any of the chemical commercial products that are purchased from chemical suppliers.

To aid suppliers and wet processing facilities in conforming to the ZDHC MRSL, the ZDHC foundation has developed a number of tools that help communicate verified information between different partners in the supply chain:

4.2.4.2. *ZDHC ChemCheck Report*

The ChemCheck Report is a chemical product passport and represents the ZDHC MRSL Conformity Certificate for Formulators (Chemical supplier). This report allows chemical formulators to share a product's MRSL Conformance.

4.2.4.3. *ZDHC InCheck Report*

The ZDHC InCheck report indicates a wet processing facilities' Chemical Inventory List's (CIL) conformance with the ZDHC MRSL parameters. It is a comprehensive overview of conformance that enables users to improve their conformance based on the information available on their chemical inputs

4.2.4.4. *ZDHC Gateway – Chemical Module*

The ZDHC Gateway is an online portal to exchange (verified) MRSL conformance information between supply chain partners. In the portal a database of MRSL conformant chemicals can be reviewed. These chemicals have been uploaded by chemical suppliers, and the ChemCheck reports show the sustainability level of their chemical products. Brands and suppliers can use the database to improve the sustainability level of their chemical inventory. Suppliers can purchase and create their InCheck report within the gateway, to show how well they are advancing in sustainable chemistry.

4.2.4.5. *Compliance and Monitoring*

In order to ensure and demonstrate compliance with ZDHC's MRSL, wet processing facilities must use the following process[9]:

Phase	Activities
1. Commitment	Commit to eliminate the use of hazardous chemicals as per G-Star MRSL and implement the MRSL in all production processes
2. Assessment	Review manufacturing process and apply the MRSL requirements
	Prepare a chemical inventory that specifies for each substance and/or chemical formulation potential intrinsic hazards based on their classification (more information in Section 4.2.2.2), maximum storage capacity, storage location(s) and application.
	Evaluate chemical suppliers to ensure they understand and meet the requirements of the MRSL (e.g. chemical supplier to provide a declaration of conformity and a safer (positive) list of non-hazardous chemical formulations)
3. Management	Assign a Chemical Manager who implements and maintain a Chemical Management System to support the MRSL implementation
	Develop a Chemical Management Policy (more information in Section 4.3.1)
	Train employees on MRSL requirements
4. Monitoring and Review	Evaluate more sustainable options in the market, for example through the ZDHC Gateway Chemical Module (more information in Appendix 3)
	Monitor MRSL conformance of all substances used and update chemical inventory on a regular basis
	Conduct wastewater testing to ZDHC Wastewater Guidelines (more information in Section 5.2.2)
5. Disclosure	Maintain chemical inventory list (CIL) on ZDHC Gateway – Chemical Module by using the ZDHC InCheck Report

[9] Source: ZDHC CMS Guidance Manual.

Phase	Activities
	Post wastewater test on the ZDHC Gateway – Wastewater Module to create a ClearStream Report

Additional Resources

- Manufacturing Restricted Substances List (MRSL)
  - ZDHC MRSL
  - ZDHC MRSL Conformance Guidance
  - ZDHC Academy Webinar on ZDHC MRSL
- Chemical inventory
  - Higg FEM How to Higg Guide
  - ZDHC Chemical Management System (CMS) Guidance Manual
- ZDHC Gateway – Chemical Module
  - ZDHC Gateway
  - ZDHC Academy Webinar on ZDHC Gateway – Chemical Module

4.3. Aspirational Level of Performance

4.3.1. Chemicals Management System (CMS)

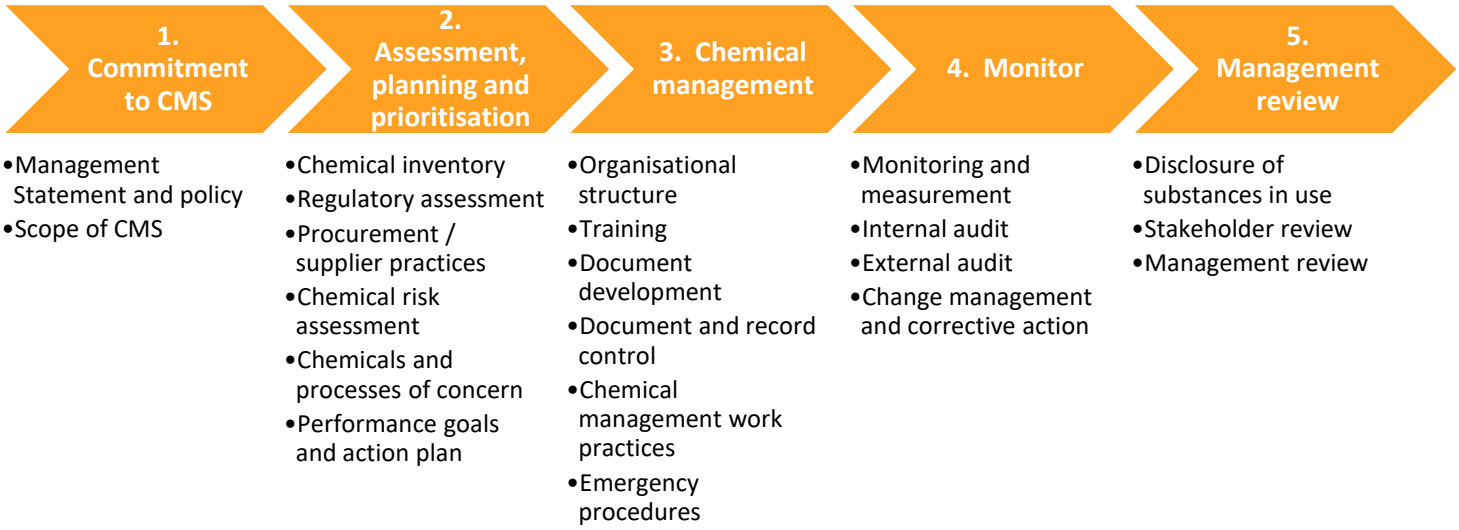
4.3.1.1. *Overview*

A Chemicals Management System (CMS) provides a framework and structure to manage chemicals holistically and to move towards zero discharge of hazardous chemicals. An effective CMS should include the following elements:

- Goals and objectives aligned with the supplier's strategic vision and business case;
- Well-defined scope of work (e.g. product categories);
- Roadmap and key milestones;
- Governance structure, roles and responsibilities;
- Chemical risk assessment to identify chemicals of concern;
- Clear expectations on chemicals management (e.g. RSL, MRSL, chemical inventory, audit and testing procedures);
- Documentation and record control; and
- Continuous monitoring and internal reporting mechanisms.

The 'ZDHC Chemical Management Systems Guidance Manual' helps suppliers in designing and implementing a CMS. The ZDHC CMS is structured in a five-step process that follows ISO management system's Plan-Do-Check-Act framework, as introduced in Section 3.3. For more detailed information on the ZDHC CMS Framework, please refer to Appendix 5.

ZDHC Chemical Management System (CMS) Framework[10]



4.3.1.2. *Roles and Responsibilities*

To run a successful chemical management system it is important that clear roles and responsibilities are assigned to different departments and employees within the organization. Since (wet processing) facilities will differ greatly in size and organisational set up there is no blueprint for the number of employees that should be involved in chemicals management. However, G-Star expects suppliers to have assigned a chemical manager or EHS manager with final responsibility for the chemical management system. Below table shows additional roles that should be assigned and the skillset required.

Role Assigned For	Specific Responsibilities	Skillset required
CMS Oversight	• Report to senior leadership • Responsible for day to day management of CMS • Responsible for tracking progress on Key Performance Indicators and goals	• Stakeholder communications • Leadership skills • Understanding and knowledge on chemicals and wet processing technologies
Regulatory Compliance	• Systematically monitors applicable regulations on a regular schedule for each applicable legal jurisdiction • Identifies new or changing compliance requirements • Informs team members where relevant	• Comprehensive knowledge about regulatory requirements • Analytical skills • Strong communication skills

[10] Source: ZDHC CMS Guidance Manual.

Role Assigned For	Specific Responsibilities	Skillset required
RSL and MRSL oversight	• Responsible for RSL and MRSL compliance and communication with supply chain partners	• Comprehensive knowledge on chemicals and wet processing technologies and processes • Analytical skills • Strong communication skills
Chemical application and management	• Responsible for process and product chemical knowledge • Responsible for knowing contact names of individuals at supply chain partners organisation with same duties	• Expert knowledge on chemicals and their application • Strong communication skills • People management skills
Hazard assessment and risk management	• Responsible for activities related to chemical hazard assessment • Responsible for knowing the contact names of individuals at supply chain partners organisation with the same duties • Communication of risk to other team members	• Expert knowledge on chemicals and their application • Analytical skills • Strong communication skills
Alternatives assessment	• Responsible for activities related to safer alternative assessment and communicating information to supply chain partners	• Expert knowledge on chemicals and their application • Analytical skills • Problem solving skills • Strong communication skills
Community of practice and sustainable chemistry	• Acts as organisation's representative for Chemical management community of practice (centre of excellence) • Responsible for chemicals management and sustainable chemistry metrics	• Comprehensive understanding of chemical management systems • Exceptional communication skills • Leadership skills

Additional Resources

- ZDHC Chemical Management System (CMS) Guidance Manual; and
- Higg FEM How to Higg Guide.

4.3.2. bluesign® System

4.3.2.1. *Overview*

bluesign® is a certification standard focused on Input Stream Management in the apparel and textile industry. The bluesign® systems helps manufacturers, chemical suppliers and apparel brands alike to ensure that all substances

and raw materials applied during the production process are safer and better for the environment, and are already verified in advance of production.

The bluesign® system sets specific criteria for ingredients, manufacturing processes and finished products in the following aspects: i) resource productivity; ii) consumer safety; iii) water emission; iv) air emission; and v) occupational health and safety.

bluesign® is a ZDHC Accepted Certifier for ZDHC MRSL Conformance. The chemical products from the bluesign® bluefinder will be recognized as Level 3 (the highest level of MRSL conformance) in the ZDHC Gateway - Chemical Module.

Moreover, chemical suppliers, fabric mills and garment suppliers can become bluesign® system partner. For fabric mills and garment suppliers this entails a rigorous assessment of their onsite chemical management system and chemical inventory. After a successful onsite review a certification follows, after which the supplier is officially a bluesign® system partner.

G-Star considers the bluesign® system as a best practice in the industry for suppliers, and highly encourages its suppliers to become a bluesign® system partner.

Additional resources

- bluesign® Input Stream Management; and
- bluesign® Criteria for Production Sites.

5. Wastewater Management

5.1. Introduction

Wastewater can be a significant contributor of pollution and contamination for workers, surrounding natural systems and communities if not managed, treated and discharged properly. As a signatory of the ZDHC Foundation, G-Star recognizes that water quality is a critical aspect of sustainable and environmental conscious manufacturing.

Within production facilities, we differentiate between industrial process water (water stream from production operations) and domestic water (non-process related waste water). Please note that this wastewater guidance focuses entirely on industrial process water.

As a strict minimum, suppliers must meet the minimum requirements outlined below. In addition, G-Star encourages suppliers to consider implementing best practices associated with wastewater management.

5.2. Minimum Requirements

5.2.1. Overview

All suppliers, their subcontractors and other business partners must comply with the following, as per our Supplier Code of Conduct, to drive G-Star's commitment towards zero discharge of hazardous chemicals:

- All outgoing wastewater must be treated before it is discharged to water bodies in compliance with local laws and regulations. All outgoing water from wet process must comply with local laws and regulations and/or the ZDHC Wastewater Guidelines, whichever is stricter;
- Wastewater testing for wet processing facilities must be conducted in accordance with the ZDHC Wastewater Guidelines at least once a year by April 30th ; and
- Suppliers must have a back-up plan if there is an emergency situation related to wastewater.

For facilities where wastewater is indirectly discharged (i.e. wastewater is sent to an industrial or publicly owned wastewater treatment plant), a verification of the external treatment, including operating conditions and compliance to local laws and regulations, is mandatory.

5.2.2. Wastewater Testing and ZDHC Wastewater Guidelines

As presented above, wastewater testing must be conducted in accordance with the ZDHC Wastewater Guidelines. The document was developed in collaboration with multiple brands, non-governmental organizations, universities and technical experts to set a unified set of expectations on wastewater testing, including but not limited to:

- Sampling methodology and sampling points (more information in Appendix 6);
- Test methods and coverage;
- Pass / fail criteria (i.e. reporting limits) for each parameter;
- Testing frequency; and
- Disclosure.

The ZDHC Wastewater Guidelines covers parameters that fall into one of the two following categories:

- *Conventional parameters:* Parameters such as temperature, pH, biological oxygen demand, chemical oxygen demand, etc., that are not relevant for zero discharge but are still critical to manage wastewater responsibly for the textile and footwear industry. Reporting limits are divided in *foundational, progressive,* and *aspirational* levels.
- *ZDHC MRSL priority chemical groups:* 12 groups of chemicals for which pass/fail reporting limits have been listed. Zero discharge of these priority groups is the ultimate goal.

5.2.3. Wastewater Test Reporting and Monitoring

G-Star aligns with the ZDHC Foundation's vision to establish a unified platform to facilitate strategic decision-making, and to centralize and simplify wastewater reporting across the industry. To do so, G-Star will leverage the ZDHC Gateway – Wastewater Module. The ZDHC Gateway – Wastewater Module is a global web-based platform that is designed to share verified wastewater and sludge test data based on testing against the ZDHC Wastewater Guidelines. It provides suppliers with an easy way to disclose secured and verified wastewater and sludge data to their clients, reduce the number of unnecessary testing and instead focuses on improving the quality of discharge.

Suppliers will be responsible to conduct wastewater testing from ZDHC Approved Laboratories. The wastewater report will be uploaded by the ZDHC Approved Laboratory on the ZDHC Gateway – Wastewater Module platform. A request will then be sent to the supplier to agree to make the wastewater test report public. Suppliers must have at least one public wastewater test report public per year.

The wastewater test reports will be generated in a standardized ZDHC ClearStream scorecard. The ZDHC ClearStream report is designed to demonstrate wastewater performance with the industry-accepted ZDHC Wastewater Guidelines and provides clear guidance on opportunities for improvement in an easy-to-read, non-technical format.

G-Star will request wastewater testing reports on a regular basis from its suppliers (applying specifications included in its supplier agreement). This will be in line with our DETOX commitment and will help to measure our progress towards zero discharge of hazardous chemicals by 2020.

5.2.4. Wastewater Emergency Back-up Plan

It is critical that all manufacturing facilities have a contingency plan in the event of a wastewater treatment failure in order to prevent untreated effluent from being discharged to the local environment. Emergency back-up plans can consist of a combination of the following strategies, among others:

- Emergency production shutdown;
- Holding tank;
- Secondary treatment; and
- Discharge to offsite water treatment plant.

Additional Resources

- Wastewater management: Higg FEM How to Higg Guide
- Wastewater testing
  - ZDHC Wastewater Guidelines
  - ZDHC Academy Webinar on ZDHC Wastewater Guidelines
- ZDHC Gateway – Wastewater Module
  - ZDHC Gateway
  - ZDHC Academy Webinar on ZDHC Gateway - Wastewater Module
- Wastewater emergency back-up plan: Factsheet, Initiative for Compliance and Sustainability (ICS)

5.3. Aspirational Level of Performance: Zero Liquid Discharge (ZLD)

As part of our DETOX commitment, we encourage all manufacturing facilities to demonstrate best practices in wastewater management such as Zero Liquid Discharge. ZLD is a water treatment process in which all wastewater is purified and recycled; therefore, leaving zero discharge at the end of the treatment cycle. ZLD is an advanced wastewater treatment method that includes ultrafiltration, reverse osmosis, evaporation/crystallization, and fractional electrode ionization to facilitate recovery and reuse of all wastewater. For more information: Zero Liquid Discharge, Aquatec.

6. Waste Management

6.1. Introduction

Waste is any material or substance that is discarded from a facility site, which can pollute and contaminate the environment and surrounding communities. As a strict minimum, suppliers must meet the minimum requirements outlined below. In addition, G-Star encourages suppliers to consider implementing good practices on waste management.

6.2. Minimum Requirements

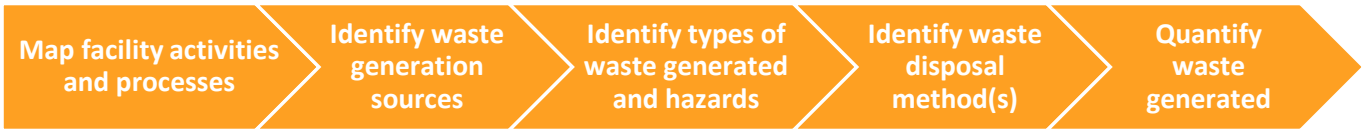
6.2.1. Overview

As per G-Star's Supplier Code of Conduct, all suppliers must:

- Ensure proper segregation, collection, transportation, treatment and disposal of waste, in accordance with all applicable laws and regulations; and
- Make sure that waste contractors have the adequate permits, licenses and qualifications, in particular for hazardous waste.

6.2.2. Establish a Waste Inventory

Developing a waste inventory is the first step in understanding the potential environmental impacts of the waste generated by each facility. The process is as follows:



6.2.2.1. *Waste Types*

There are two types of waste generated that must be tracked at the facility-level according to Higg Index FEM 3.0:

- *Non-hazardous waste:* discarded materials from the consumption of goods and services and the manufacture of goods, including non-hazardous production waste (e.g. cloth, leather, plastic, and paper or packaging waste) and domestic waste (e.g. food waste from canteens, sanitary waste from office and dormitory areas); and
- *Hazardous waste:* waste that could cause harm to public health and/or the environment because of its chemical, physical, or biological characteristics (e.g. flammable, explosive, toxic, radioactive, infectious waste), in the form of liquids, solids, gases or sludge.

Waste type	Waste sub-type	Waste stream
Non-hazardous waste	Materials	Metal
		Plastic
		Paper
		Cans
		Food
		Glass
		Cartons
		Other
	Domestic waste	All domestic waste combined
Hazardous waste	Production waste	Empty chemical drums and containers
		Film and printing frame
		Wastewater treatment sludge (industrial)
		Expired / unused / used chemicals (e.g. waste oil, solvents, reactants)
		Compressed gas cylinders (e.g. refrigerants)
		Contaminated materials
		Other
	Domestic waste	Batteries
		Fluorescent light bulb
		Ink cartridges
		Waste oil and grease (from cooking)
		Empty containers (e.g. cleaning products, sanitizing, pesticides)
		Electronic waste
		Coal combustion residuals (fly ash and bottom ash/coal slag)
		Wastewater treatment sludge (household)
		Other

6.2.2.2. *Waste Disposal Methods*

Disposal method	Definition
Reuse	Using a waste product again for the same or different purpose without further manufacture[11]
Recycling	The process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products[12]
Composting	The controlled process whereby compostable organic wastes are pasteurised and microbiologically transformed under predominantly aerobic and thermophilic condition[13]
Recovery (including energy recovery)	The process of extracting materials or energy from the waste stream; energy recovery is the combustion of solid waste to generate electricity[14]
Incineration (mass burn)	The thermal destruction of waste for the primary purpose of disposal, without the recovery of energy[15]
Deep well injection	Injection of wastes into deep, confined rock formation[16]
Landfill	Waste disposal in dumps without energy recovery
On-site storage	Onsite storage of wastes
Other	Other waste disposal options (as specified by the reporting entity)

6.2.3. Worker Instructions and Training

Suppliers must provide sufficient working instructions and signs for handling, segregating and transporting hazardous waste. All staff involved in these processes (e.g. maintenance and custodial staff) performed on hazardous waste must be trained on appropriate handling procedures. The following elements should be considered for the training program:

- Proper hazardous waste handling;
- Overview of legal requirements and the environmental consequences of poor waste handling and management;
- How to identify, segregate, collect and transport hazardous waste;
- How to track and weigh the quantity of hazardous waste;
- Awareness on hazardous waste accident prevention policy, emergency preparedness and response procedure management;
- Storage and disposal techniques and procedures;
- Overview of positive environmental benefits of waste segregation including quality control and ensuring highest value recycling options;
- Personal protective equipment distribution and usage management; and
- Introduction on the use of proper tools and protective equipment when handling waste.

Additional Resources

- Higg FEM How to Higg Guide

[11] Inspection Checklist Tool for Facilities Generating and Recycling Hazardous Secondary Materials, US EPA.
[12] Frequent Questions on Recycling, US EPA.
[13] Environmental Standard: Composting Division 3 Part V Environmental Protection Act 1986, Government of Western Australia.
[14] World Energy Resources, Waste to Energy, World Energy Council.
[15] EPA 842/09 Waste Guidelines, Waste Definitions, Government of South Australia.
[16] Underground Injection Control (UIC), Class I Industrial and Municipal Waste Disposal Wells, US Environmental Protection Agency.

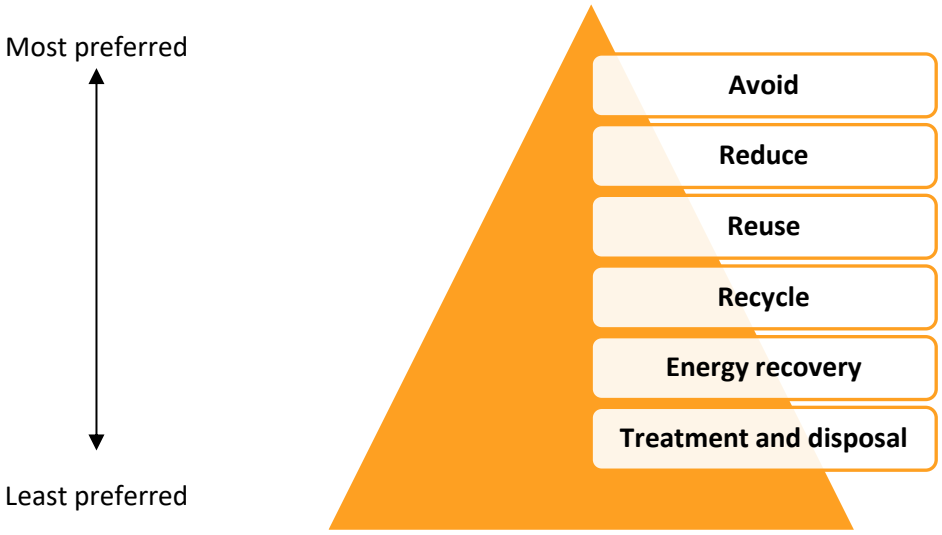
6.3. Aspirational Level of Performance

6.3.1. Waste Management Hierarchy

7.3.1.1 ***Overview***

G-Star urges suppliers to prevent and reduce waste wherever possible. A framework, the waste management hierarchy, was developed to prioritize waste reduction opportunities.

Waste Management Hierarchy



For more information on waste reduction opportunities aligned with the waste management hierarchy for apparel and textile manufacturers: Integrated Waste Minimization Techniques In Apparel Design: A Sustainable Perspective.

6.3.2. Set a Waste Reduction Target

Reduction targets will help suppliers to achieve, measure and track reductions over time. A target should include:

- Boundaries (e.g. waste streams);
- Base year (i.e. start year of the target);
- Target year (i.e. end year of the target); and
- Reduction (in quantity or as a percentage).

There are commonly two types of targets on waste:

- *Waste reduction target:* Target to minimize the quantity of waste generated by the facility; and
- *Waste diversion target:* Target to increase the quantity of waste that is re-purposed (e.g. recycling, reuse, composting, recovery) and diverted from disposal in landfills / incinerators.

For more information on how to set a waste reduction target: Higg FEM How to Higg Guide.

6.3.3. Zero Waste to Landfill

Zero waste to landfill is a goal not to send any trash to landfills, incinerators or the ocean. Zero waste encourages the redesign of resource life cycles so that all products are repurposed. For more information on zero waste and strategies to drive the target: Zero Waste Hierarchy, ZWIA.

7. Sustainable Raw Materials

7.1. Introduction

The growing population and industrial activities cause shortages of raw materials and rising prices. Industries should strive towards the reduction of materials, and look for options to use renewable materials, use recycled materials and reuse materials whenever possible.

7.2. Minimum Requirements

7.2.1. Overview

As per G-Star's Supplier Code of Conduct, all suppliers must:

- Comply with G-Star RAW Materials Policy for the use of raw materials in G-Star products and must supply valid certification according to the accepted standards listed in the G-Star Sustainable Materials Guidelines.

7.2.2. G-Star RAW Materials Policy

To clearly communicate G-Star's expectations towards the use of raw materials in our products, we have developed two documents:

- G-Star RAW Materials Policy
  This document lists our restrictions and requirements for ethical sourcing of raw materials. The standards in the Materials Policy focus on animal welfare, nature conservation and human rights. It includes a ban on fur and angora and lists requirements for down, leather, wool, wood and cotton.
- G-Star Sustainable Materials Guidelines
  This documents gives more detailed guidelines for suppliers on how compliance with the G-Star RAW Materials Policy can be reached and also states which (public) commitments G-Star has made on the transition towards using more sustainable materials. It outlines the materials G-Star considers to be sustainable and what kind of certifications are accepted.

Additional resources

- G-Star RAW Materials Policy
- G-Star Sustainable Materials Guidelines[17]

7.3. Aspirational Level of Performance

At G-Star, we not only work to increase the use of sustainable materials in our collection but also strive to improve the finishes and washes we use in our production process. We can minimize the environmental impact of our products by looking for materials, washing techniques and finishes that contribute to a more sustainable future without compromising on quality, comfort and design.

At this point there are no widely accepted standards or monitoring tools available to consistently rank or score the sustainability level of a final product. However, the SAC is in the process of developing a Higg Materials Sustainability Index and a Higg Product Module. Once thoroughly developed and tested by the Sustainable Apparel

[17] This document is available upon request for suppliers, but is currently not listed on G-Star's website.

Coalition (SAC), G-Star will consider to adopt these modules to be able to show and benchmark the sustainability level of its products. Suppliers will be updated on this in due course.

Until such time we will continue to develop and improve our sustainability practices on material and product level. Suppliers are highly encouraged to contact G-Star designers and product developers to work on sustainable innovations. By cooperating with our supply chain partners we have been able to create highly sustainable products in the past, and continuously look for more opportunities to do so in the future.

8. Energy Use

8.1. Introduction

Energy production and energy use are the largest man-made sources of air pollution and greenhouse gas (GHG) emissions globally. As climate change emerges as the most severe human, environmental, and economic risk in the world, more stringent requirements and regulations are likely to be imposed by governments to reduce GHG emissions. A wide variety of energy reduction opportunities are available, including energy efficiency, renewable energy and biomass energy generation, among others, that can lead to significant cost savings for facilities.

As a strict minimum, suppliers must meet the minimum requirements outlined below. In addition, G-Star encourages suppliers to consider setting reduction targets, identifying and implementing reduction opportunities and developing an action plan on energy consumption.

8.2. Minimum Requirements

8.2.1. Overview

As per G-Star's Supplier Code of Conduct, all suppliers must:

- Record energy consumption for all types of energy used; and
- Monitor trends in energy usage in intensity terms against production metrics (e.g. weight and/or quantity of garments produced / material processed).

8.2.2. Energy Sources

The facility must identify all the sources that use energy (also called energy source), both in the manufacturing process and for non-manufacturing areas and processes (e.g. canteens, dormitories, company-owned vehicles).

Category	Energy source	Examples of equipment / process
Stationary fuel combustion	Coal Natural gas Petrol Diesel Fuel oil Biomass	• Boiler • Generator • Motor • Incinerator • Chiller and burner • Production equipment (e.g. setting machine)
Mobile fuel combustion	Petrol Diesel	Company-owned vehicles (e.g. trucks, cars)
Purchased energy	Purchased electricity	• Lighting • Compressed air system • Motor • Heating, Ventilation and Air Conditioning (HVAC) • Dryer

Category	Energy source	Examples of equipment / process
		• Production equipment (e.g. cutting machine)
	Purchased chilled water	• Chiller
	Purchased steam	• Heating • Production equipment (e.g. ironing, dyeing, washing)
Onsite energy generation and consumption	Solar photovoltaic	• Electricity generation • Water heating
	Wind	
	Hydro	
	Micro-hydro	
	Geothermal	• Boiler • Incinerator

8.2.3. Measure and Track Energy Use

Suppliers must report energy use for each energy source presented in the previous section in unit mass (e.g. MJ, kWh) or volume (e.g. m^3, l) through the Higg FEM self-assessment. For each energy source, the facility must specify the method that was used to track energy use (in order of preference):

Method (Higg Index FEM)	Description
Invoices	Energy use is tracked from invoices (e.g. utility bill, fuel purchase record)
Meters	Energy use is tracked with an internal metering system
Estimates	• Primary activity data is not available; facility has to use proxies to extrapolate energy use • The Climate Registry's General Reporting Protocol (Part III) and Engineering Toolbox both provide guidance to estimate common energy sources

All supporting documentation, including invoices and estimation methodology should be well documented and recorded to facilitate the external verification process.

8.2.4. Monitor Energy Intensity Trends

Tracking energy consumption in intensity terms against production metrics allows suppliers to evaluate how efficient their energy use is, and to compare performance over time.

The following formula should be used to quantify energy intensity for a given reporting period:

$$\text{Energy intensity} = \frac{\text{Total absolute energy use}}{\text{Total business production}}$$

Weight and/or quantity of garments produced / material processed can be used as intensity metric(s) to evaluate energy use intensity.

Additional Resources

- Higg FEM How to Higg Guide;
- General Reporting Protocol (Part III), Climate Registry; and
- Properties of Saturated Steam, Engineering Toolbox.

8.3. Aspirational Level of Performance

8.3.1. Track Greenhouse Gas Emissions

Once the facility understands its energy use, it is recommended that the facility establishes a carbon inventory to understand the GHG emissions it emits and hotspots to prioritize to reduce GHG emissions. The GHG Protocol Corporate Standard is the most widely accepted reporting standard to develop a carbon inventory and measure GHG emissions.

The table below summarizes the different GHG emission sources and scopes. For more information, please refer to Appendix 7. Note that future iterations of the Higg FEM will automatically calculate GHG emissions from energy use (i.e. Scope 1 and 2 emissions).

Scope	Description
Scope 1 (direct) emissions	Emissions from sources that are owned or controlled by the reporting company (e.g. stationary and mobile fuel combustion).
Scope 2 (indirect) emissions	Emissions associated with the generation of electricity, heating/ cooling, or steam purchased for the facility's own consumption.
Scope 3 (indirect) emissions	Indirect emissions other than those covered in Scope 2 emissions (e.g. purchased goods and services, waste generation in operations, transportation and distribution)

8.3.2. Implement Energy Reduction Opportunities and Establish an Action Plan

G-Star encourages suppliers to implement energy reduction opportunities such as energy efficiency and renewable energy. Renewable energy in many regions of the world is becoming increasingly available and reliable. Although integrating renewable energy may not reduce energy consumption per se, it helps to reduce GHG emissions.

Conducting an energy assessment and developing an action plan (for example, with the support of a third-part service provider) would be helpful to identify energy reduction opportunities and to establish a timeframe for implementation. An action plan typically consists of a table summarizing for each energy reduction opportunity:

- Description (e.g. "Replace all halogen spotlights with LED lighting");
- Investment costs;
- Annual energy savings;
- Annual cost savings;
- Payback period;
- Priority; and
- Implementation timeframe.

The Sustainable Apparel Coalition (SAC) developed an Implementation Plan Template that can be used as a template for an energy action plan.

8.3.3. Set an Energy Consumption / GHG Emissions Reduction Target

Reduction targets will help suppliers to achieve, measure and track reductions over time. A target should include:

- Boundaries (e.g. energy sources, operations)
- Base year (i.e. start year of the target)
- Target year (i.e. end year of the target)
- Target type

- Absolute (e.g. kWh or tCO_2e[18]) OR
- Intensity (e.g. kWh / kg of production volume)

- Reduction (in quantity or as a percentage)

8.3.4. Science-Based Target (SBT)

A Science-Based Target (SBT) is a GHG emissions reduction target in line with the level of decarbonisation required to keep a global temperature increase below 2°C compared to pre-industrial temperatures. This level of ambition translates to a reduction of 50-80% in GHG carbon emissions by 2050 from 2000 levels.

The World Resources Institute (WRI) and the Science Based Targets initiative (SBTi) developed guidance to support companies across the apparel and footwear value chain to set SBTs. For more information: SBT Apparel Guidance.

Additional Resources

- Higg FEM How to Higg Guide;
- GHG Protocol Corporate Standard;
- Guidelines for Conducting an Energy Audit in Industrial Facilities
- Implementation Plan Template, Sustainable Apparel Coalition; and
- SBT Guidance for Apparel, WRI and SBTi.

9. Water Use

9.1. Introduction

The apparel and textiles industry is heavily dependent on water. At G-Star, we acknowledge that the way our products are produced has a direct impact on clean water resources. In addition to our zero discharge of hazardous chemicals commitment which focuses on water quality, we understand that water availability and minimizing water use if of equal important, particularly in areas with high water stress.

As a strict minimum, suppliers must meet the minimum requirements outlined below. In addition, G-Star encourages suppliers to consider setting reduction targets, identifying and implementing reduction opportunities and developing an action plan on water consumption.

9.2. Minimum Requirements

9.2.1. Overview

As per the Supplier's Code of Conduct, suppliers shall:

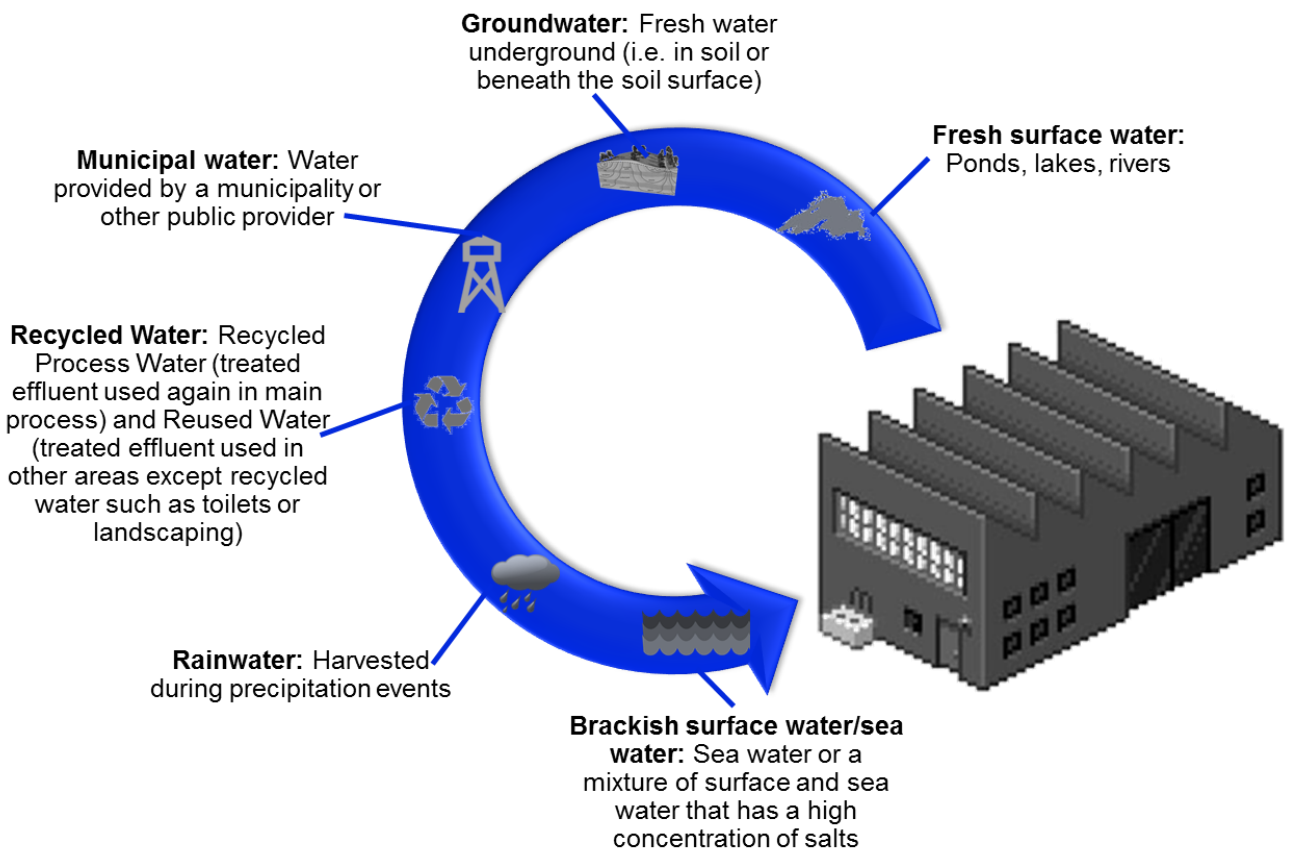
- Have an overview of sources from which water is withdrawn and used (e.g. purified drinking water, municipal mains, wells, surface water, collected rainwater, recycled grey water); and
- Keep records of water consumption per source and monitor trends in water usage in intensity against production metrics (e.g. weight and/or quantity of garments produced / materials processed).

9.2.1.1. Water Sources

Suppliers must know, at the facility-level, all the sources from which water is withdrawn. This includes water consumed for both manufacturing and non-manufacturing processes (e.g. canteens, dormitories).

[18] CO_2 equivalent (CO_2e) is the universal unit of measurement to evaluate the release of different greenhouse gases against a common basis.

Overview of water sources[19]



9.2.2. Measure and Track Water Use

Suppliers must report water consumption for each water source presented in the previous section in volume (e.g. m^3, l) through the Higg FEM self-assessment. For each water source, the facility must specify the method that was used to track water consumption (in order of preference):

Method (Higg Index FEM)	Description
Invoices	Water consumption is tracked from invoices (e.g. utility bill, fuel purchase record)
Meters	Water consumption is tracked with an internal metering system
Estimates	Primary activity data is not available; facility has to use proxies to extrapolate consumption

All supporting documentation, including invoices and estimation methodology should be well documented and recorded to facilitate the external verification process.

9.2.3. Monitor Water Intensity Trends

Tracking water use in intensity terms against production metrics allows suppliers to evaluate how efficient their water use is, and to compare performance over time.

[19] Source: Higg FEM How to Higg Guide.

The following formula should be used to quantify water intensity for a given reporting period:

$$\text{Water intensity} = \frac{\text{Total absolute water consumption}}{\text{Total business production}}$$

Weight and/or quantity of garments produced / material processed can be used as intensity metric(s) to evaluate energy use intensity.

Additional Resources

- Higg FEM How to Higg Guide
- CDP Water Reporting Guidance;
- CEO Water Mandate Corporate Water Disclosure Guidelines; and
- Alliance for Water Stewardship.

9.3. Aspirational Level of Performance

9.3.1. Implement Water Reduction Opportunities and Establish an Action Plan

G-Star encourages suppliers to implement water reduction opportunities to reduce water use at the facility-level. Key water reduction opportunities are presented in the table below.

Reduction opportunity	Description
Eliminate	Avoid water use or switch to waterless technology (e.g. waterless urinals)
Reduce	Reduce water use through implementation of water conservation measures (e.g. water-saving toilets and faucets fixtures, improved cooling tower control)
Reuse and recycle	Reduce water demand by reusing water and/or wastewater (treated or untreated) that has been used more than once before; some processes may require water to be recycled before it is reused[20]
Replace	Use seawater or lower quality water (e.g. reclaimed water, treated wastewater from another organization) onsite in place of fresh water supply (e.g. flushing toilet with seawater)
Rainwater harvesting	Capture or harvest rainwater or storm water onsite as an alternative water supply

Conducting a water assessment and developing an action plan (for example, with the support of a third-part service provider) would be helpful to identify water reduction opportunities and to establish a timeframe for implementation. An action plan typically consists of a table summarizing for each water reduction opportunity:

- Description (e.g. “Collect and reuse cooling water”);
- Investment costs;
- Annual water savings;
- Annual cost savings;
- Payback period;
- Priority; and
- Implementation timeframe.

The Sustainable Apparel Coalition (SAC) developed an Implementation Plan Template that can be used as a template for a water action plan.

[20] CDP water security reporting guidance, 2018.

9.3.2. Set a Water Consumption Reduction Target

Reduction targets will help suppliers to achieve, measure and track reductions over time. A target should include:

- Boundaries (e.g. water sources, operations)
- Base year (i.e. start year of the target)
- Target year (i.e. end year of the target)
- Target type
  - Absolute (e.g. cubic meters or litres) OR
  - Intensity (e.g. cubic meter / kg of production volume)
- Reduction (in quantity or as a percentage)

Additional Resources

- Higg FEM How to Higg Guide; and
- Implementation Plan Template, Sustainable Apparel Coalition.

10. Air Emissions

10.1. Introduction

Pollution is unhealthy for humans and the environment. Visible smog (such as smog clouds over cities) is one result of air emissions from production facilities, but industrial processes and operations also emit other invisible pollutants into the air that impact human health and contribute to climate change.

Managing air emissions requires a different approach than managing energy, water, and waste. Air emissions are regulated to a set level, while energy, water, and waste can be continuously improved. As a result, this section focuses principally on minimum requirements for suppliers.

10.2. Minimum Requirements

10.2.1. Overview

As per the Supplier's Code of Conduct, suppliers must:

- Have the necessary permits for air emissions and/or report its air emissions to the relevant authorities as required by law;
- Establish an air emissions inventory and keep records of the volumes and types of air emissions; and
- Have an action plan to control and reduce air emissions.

10.2.2. Air Emission Sources and Air Pollutants

Air emissions are commonly generated by factories from:

- **Production processes**, including, among others, production line equipment and manufacturing processes; and
- **Facility operations**, including, among others, boilers, generators and cooling systems.

There are three types of air emissions presented in the table below, along with examples of equipment and processes that emit air pollutants and of potential air pollutants:

Air emissions type	Definition	Examples of equipment / processes	Examples of air pollutants
Point Source or Stack Emissions	Stationary identifiable sources of emissions that release pollutants into the atmosphere	• Boilers • Generators • Combustion engines • Industrial ovens • Combustion heating • Cooling systems	• Dust / particulates (e.g. PM10, PM2.5) • Various oxides of nitrogen (NOx) • Various oxides of sulphur (SOx) • Volatile Organic Compounds (VOCs) • Lead • Hydrochloride • Water vapour / steam
Mobile Emissions	Emissions from equipment that moves from one location to another.	• Company-owned vehicles • Construction equipment	• Dust / particulates (e.g. PM10, PM2.5) • Various oxides of nitrogen (NOx) • Various oxides of sulphur (SOx) • Toxic air pollutants
Non-Point or Fugitive Emissions	Emissions which do not pass through a stack, chimney, vent, or other functionally-equivalent opening. Fugitive emissions could also be the result of construction activities that generate dust or other emissions. These types of emissions are seldom included in the permitting process.	• Yarn spinning or synthetic fiber manufacturing • Finishes[21] • Solvents • Adhesives/cementing • Printing • Dyeing • Tenter frames or other heating process • Sprayed chemicals or paints • Spot cleaners • Moulding • Refrigerants	• Dust / particulates (e.g. PM10, PM2.5) • Volatile Organic Compounds (VOCs) • Ozone Depleting Substances (ODS) • Toxic air pollutants • Regulated cotton dust emissions

10.2.3. Measure and Track Air Emissions

A facility needs an inventory to track and manage air emissions and their sources. To prepare the inventory, emissions from all processes, ancillary activities and equipment should be included. Regular review should be carried out to make sure the inventory is up-to-date. This inventory should include emissions sources regulated by permit as well as those not currently regulated.

[21] Any mechanical or chemical process that occurs after dying to affect the look, performance, or feel of the product.

The facility must identify all air emission sources, both in the manufacturing process and for non-manufacturing areas and processes (e.g. canteens, dormitories, company-owned vehicles). Typical discharge points for air emissions are:

- Stacks and chimneys;
- Open tanks;
- Transport vehicles;
- Handling and moving dusty materials; and
- Solvent applications.

The following elements are suggested to be included in the inventory:

- The pollutants known or likely to be present;
- The quantity of each pollutant emitted;
- Records (test records or estimations) detailing how the quantity of emissions reported were calculated;
- Emissions/discharge points;
- Any control devices;
- Frequency of monitoring; and
- Compliance with legal regulations.

The 'How to Higg Guide' provides additional guidance on how to measure and estimate quantity of air pollutants emitted if not direct measurement is available. For more information, please refer to the guidance for Question 2 "Select all sources of air emissions that result from production processes" in the Air Emissions section: https://apparelcoalition.zendesk.com/hc/en-us/articles/115002449451-Air-Emissions.

Sumerra developed an Air Emissions Inventory that can be used as a template by factories. For more information: https://www.sumerra.com/wp-content/uploads/Air-Emissions-Inventory.xlsx.

Additional Resources

- Higg Index FEM How to Higg Guide;
- International Finance Corporation (IFC)'s Environmental, Health and Safety Guidelines: Air Emissions and Ambient Air Quality;
- ASHRAE Refrigerant Designations; and
- Sumerra Air Emissions Inventory.

10.3. Aspirational Level of Performance

10.3.1. Implement Air Emissions Reduction Opportunities

Several opportunities exist to control and reduce air emissions, in particular on modernizing equipment, such as:

- Retrofitting existing machinery with newer technologies, for example upgrade refrigeration and/or air conditioning systems so that they are compatible with more environmentally-friendly refrigerants with lower GWP;
- Optimizing abatement equipment;
- Purchasing new equipment with more advanced technologies, for example procurement of a new boiler or generator which is powered by cleaner fuels; and
- Investing in air emissions prevention and control technologies;

The International Finance Corporation (IFC)'s Environmental, Health and Safety Guidelines: Air Emissions and Ambient Air Quality provides guidelines on good and best practices on air emissions, including monitoring, controlling and reducing air emissions.

11. Contact Information

For more information, please do not hesitate to contact:

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12. Appendices

Appendix 1: Globally Harmonized System of Classification and Labelling of Chemicals (GHS/CLP)

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	**Flame**  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	**Exclamation Mark**  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  • Gases Under Pressure	**Corrosion**  • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	**Exploding Bomb**  • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  • Oxidizers	**Environment** **(Non-Mandatory)**  • Aquatic Toxicity	**Skull and Crossbones**  • Acute Toxicity (fatal or toxic)

Source: United Nations.

Appendix 2: Safety Data Sheet (SDS) Outline

#	Section	Description	Status
1	**Identification**	Product identifier, manufacturer or distributor name, address, phone number, emergency phone number, recommended use, and restrictions on use	Mandatory
2	**Hazard(s) identification**	All hazards regarding the chemical and required label elements.	
3	**Composition / information on ingredients**	Information on chemical ingredients and trade secret claims.	
4	**First-aid measures**	Required first aid treatment for exposure to a chemical and the symptoms (immediate or delayed) of exposure	
5	**Fire-fighting measures**	The techniques and equipment recommended for extinguishing a fire involving the chemical and hazards that may be created during combustion	
6	**Accidental release measures**	Includes: emergency procedures, protective equipment and proper methods of containment and clean up	
7	**Handling and storage**	Precautions for safe handling and storage, including incompatibilities	
8	**Exposure controls/Personal protection**	OSHA's permissible exposure limits (PELs), threshold limit values (TLVs), appropriate engineering controls, and personal protective equipment (PPE).	
9	**Physical and chemical properties**	The chemical's characteristics	
10	**Stability and reactivity**	Chemical stability and possible hazardous reactions	
11	**Toxicological information**	Routes of exposure (inhalation, ingestion, or absorption contact), symptoms, acute and chronic effects, and numerical measures of toxicity	
12	**Ecological information**	How the chemical might affect the environment and the duration of the effect	Optional
13	**Disposal considerations**	Describes safe handling of wastes and methods of disposal, including the disposal of any contaminated packaging	
14	**Transportation information**	Includes packing, marking, and labeling requirements for hazardous chemical shipments	
15	**Regulatory information**	Indicates regulations that apply to chemical	
16	**Other information**	Includes date of preparation or last revision	

Source: https://danielstraining.com/the-sixteen-16-sections-of-the-safety-data-sheet-sds/.

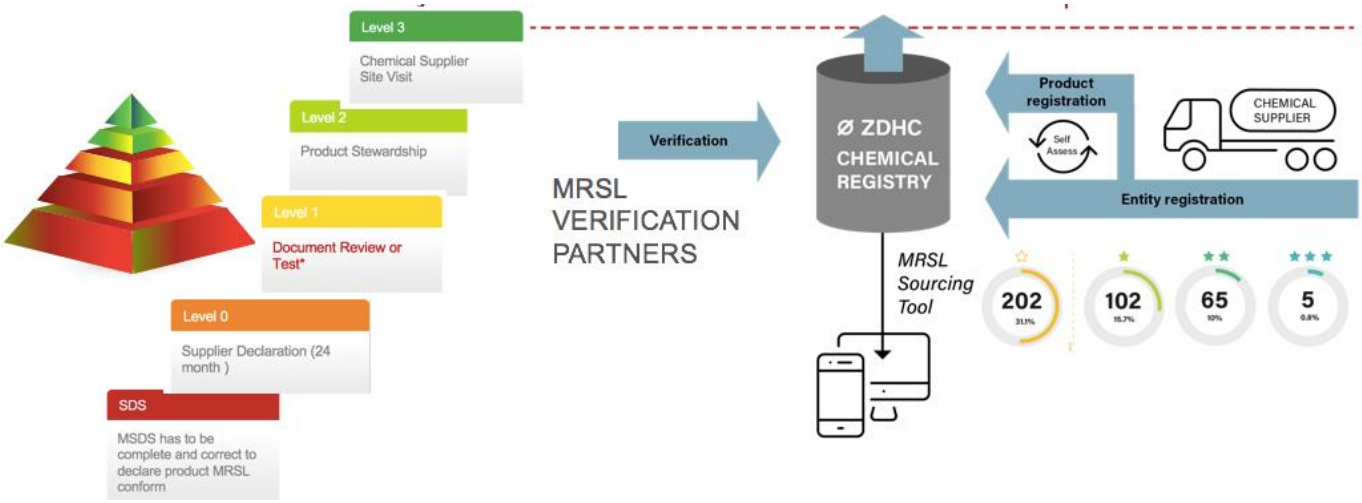
Appendix 3: ZDHC MRSL Conformance Levels, Verification and Registration

The ZDHC Programme chooses to assess ZDHC MRSL conformance of chemical products by relying on third-parties who provide certification systems, based on input stream management concept and product evaluation that are recognized and accepted by the ZDHC Programme as credible.

ZDHC MRSL conformance means that the chemical formulation does not contain any of the chemical substances on the ZDHC MRSL above the ZDHC MRSL threshold commercial formulation limit values. ZDHC MRSL conformance levels range from 0 to 3 as shown below. These levels provide a buyer of chemical products a level of confidence indicating how any given chemical product conforms to the ZDHC MRSL. The higher the conformance level, the more extensive and thorough the review of the chemical formulation and its producer can be guaranteed.

Chemical formulations with certifications from these suppliers are termed ZDHC MRSL conforming and will be listed in the ZDHC Chemical Gateway. While some of the certification systems may go beyond checking for ZDHC MRSL conformance, the ZDHC MRSL conformance process only refers to whether the chemical formulation meets the requirements of the ZDHC MRSL.

Not all chemical suppliers currently work with a third-party certification body. To account for this, the ZDHC MRSL conformance process includes a process to assist chemical suppliers on their journey to demonstrating conformance through third-party certifications. They can register their company and the Safety Data Sheet (SDS) for the product on the ZDHC Chemical Gateway.



Source: ZDHC Foundation.

Appendix 4: ZDHC Chemical Management System (CMS) Framework

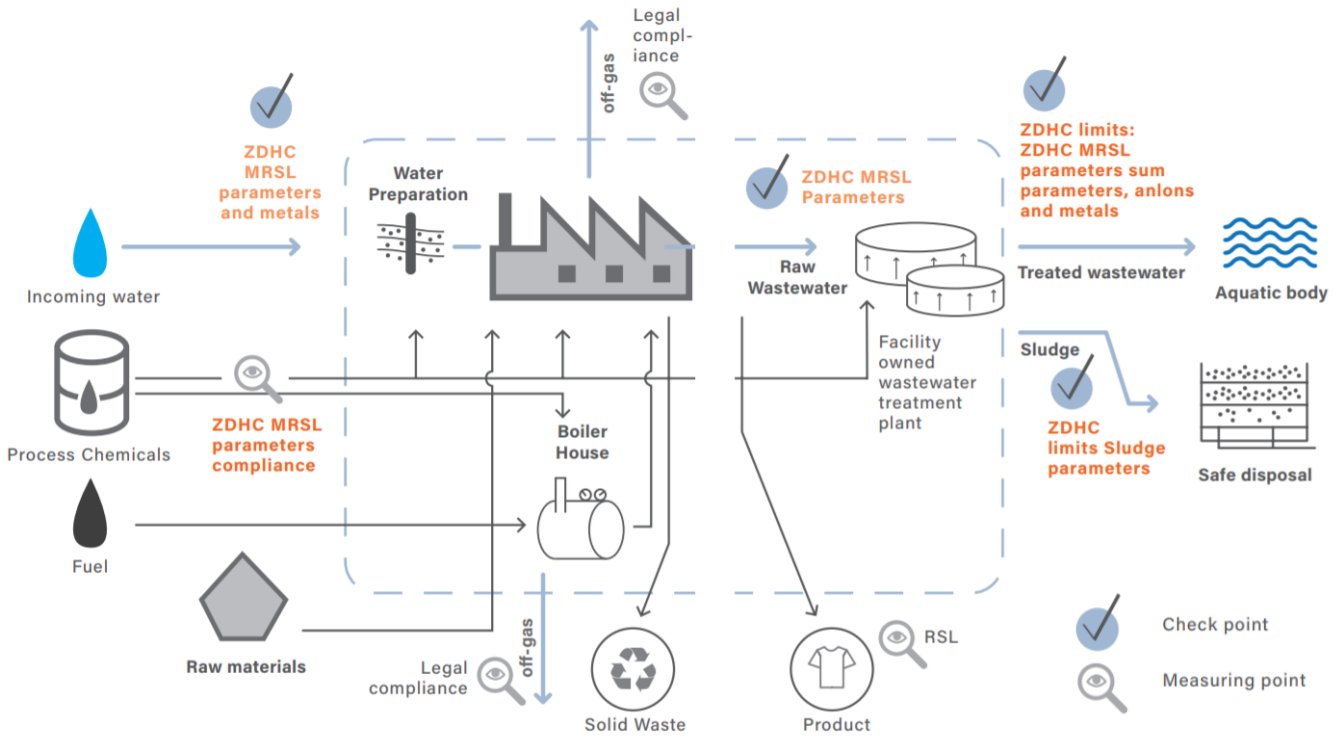
Section	Step	Level[22]
1. Commitment to CMS	1.1 Develop Management Policy Statement	Foundational
	1.2 Define scope of CMS	Foundational
2. Assessment, planning and Prioritisation	2.1. Systematically identify and document chemicals used and stored in your organisation, including: facility plan, chemical material flow diagrams and comprehensive chemical inventory	Foundational - Progressive
	2.2. Conduct regulatory assessment to: i) monitor regulations and legal permit requirements, and ii) verify compliance	Foundational
	2.3. Refine procurement / supplier practices, including: i) developing a Chemical Purchasing Policy, ii) identifying chemical suppliers, and iii) establishing a Standard Operating Procedure to approve / remove suppliers	Foundational
	2.4. Perform chemical risk assessment by defining processes to: i) establish, document and implement chemical hazard risk assessment, ii) reduce environmental impacts, and iii) reduce Health and Safety impacts	Foundational
	2.5. Flag and manage chemicals and processes of concern by: i) identifying gaps and losses in current processes, and ii) verifying compliance with RSL and MRSL	Foundational
	2.6. Set performance goals and action plans, such as MRSL compliant formulations	Foundational - Aspirational
3. Chemical management	3.1. Define organization structure, including: i) roles and responsibilities, and ii) communications on CMS	Foundational
	3.2. Provide training to employees on: i) management processes, ii) regulations, iii) work practices, and iv) ZDHC MRSL and tools	Foundational
	3.3. Draft CMS Manual that references related documentation, procedures and records, and update as needed	Foundational
	3.4. Define procedure to control documents and records	Foundational
	3.5 Establish chemical management work practices, such as: i) exposure control measures, ii) safety data sheet management, iii) chemical handling, iv) chemical storage, v) chemical transportation, vi) chemical labelling, vii) chemical use, viii) personal protective equipment, ix) laboratory practices, x) maintenance and housekeeping, and xi) waste and disposal	Foundational
	3.6. Develop emergency procedures and emergency response plan	Foundational
4. Monitor	4.1. Monitor and measure continuous improvements in goal progress, regulatory compliance, operating conditions and customer satisfaction	Foundational - Progressive
	4.2. Conduct internal audits periodically	Foundational
	4.3. Conduct external audits periodically	Foundational
	4.4. Define change management process and implement corrective action	Foundational
5. Management review	5.1 Disclose substances in use	Foundational
	5.2. Engage stakeholders (e.g. local public officials, environmental stewardship organizations) for review and feedback	Foundational - Progressive
	5.3. Engage Senior Management to determine the suitability and effectiveness of the CMS, review progress towards the goals set, and to obtain feedback on how to improve the CMS	Foundational

Source: ZDHC CMS Guidance Manual.

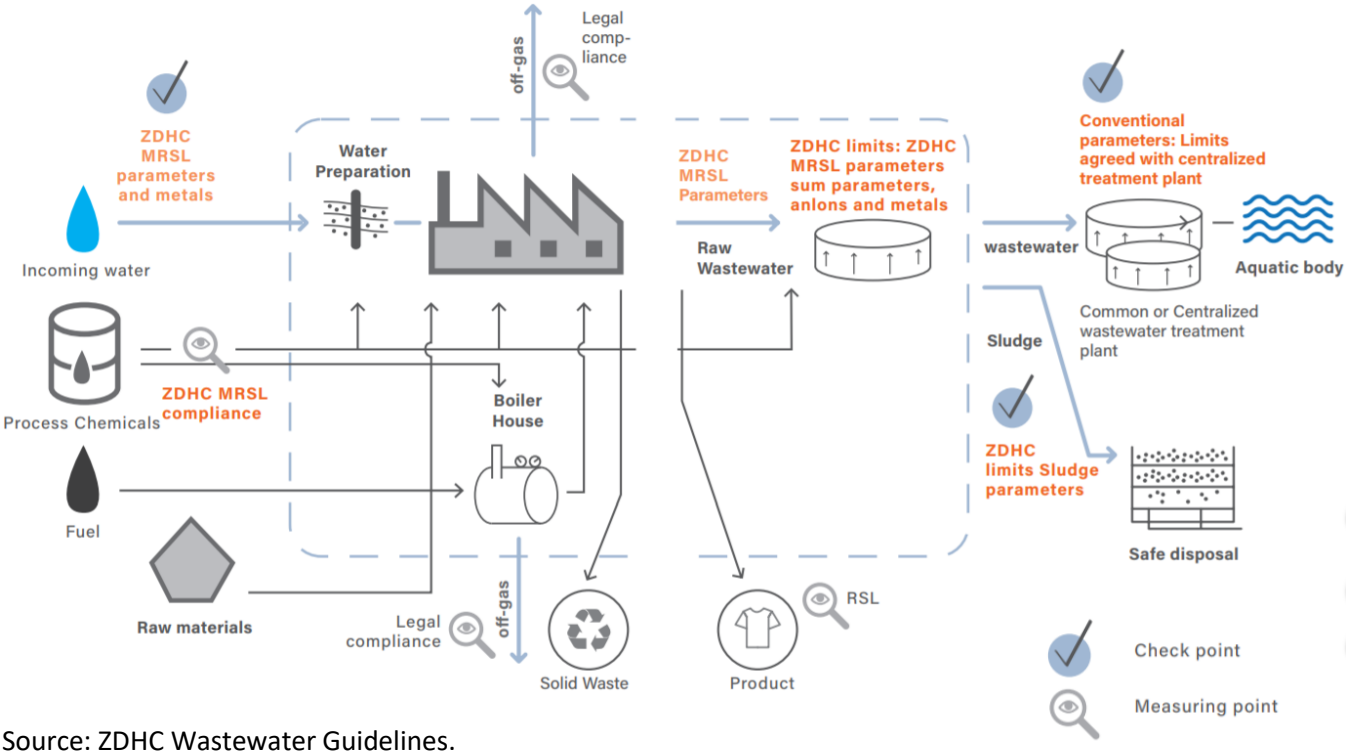
[22] ZDHC defined three levels that reflect different degrees of chemical management maturity and organizational skills: i) foundational (i.e. beginner); ii) progressive (i.e. started but room to grow); and iii) aspirational (i.e. advanced).

Appendix 5: ZDHC Wastewater Testing Sampling Points

Sampling points for facility with own wastewater treatment plant (WWTP) and direct discharge

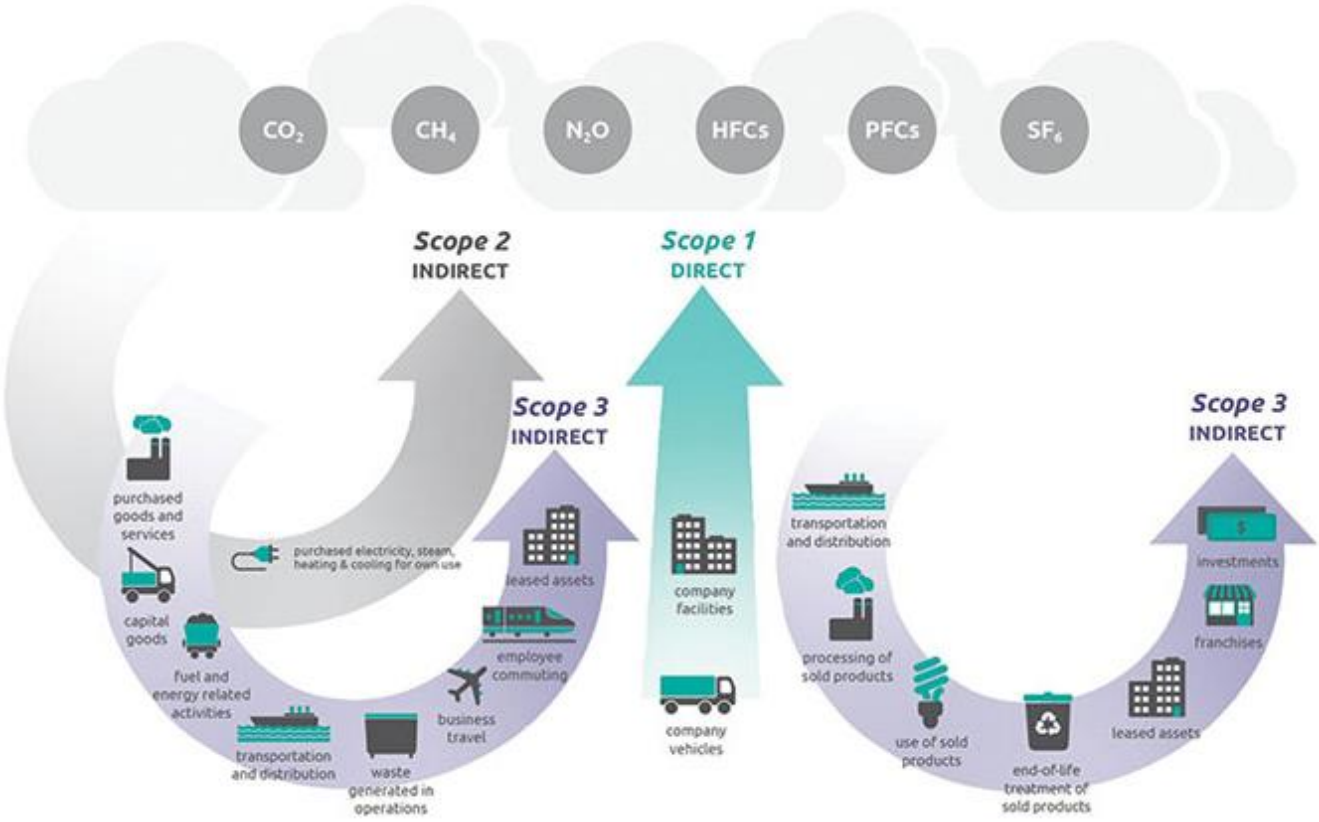


Sampling points for facility with indirect discharge; WWTP is managed by third-party, or, optionally, company has pre-treatment (e.g. equalization, buffering) onsite



Source: ZDHC Wastewater Guidelines.

Appendix 6: Overview of GHG Emissions



Source: GHG Protocol Corporate Standard.