ØZDHC

DRAFT FOR ZDHC INDUSTRY REVIEW

We encourage the ZDHC community to review and feedback on this initial draft.

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Deadline for comments: 31 Dec 2026

ZDHC Water Use Benchmarks for Textiles

(For ZDHC Industry Review)

Draft Version 1.0

August 2026

NOTES

This document is a draft for industry review, commenting and validation of the water use benchmarks, their scope, measurement and calculation. Before final publication, comments will be reviewed and taken into consideration where appropriate. Any mention of innovations and/or innovative practices within this document are provided as examples and shouldn't be construed as the only ones available. Organisations are responsible for conducting their own research into all possible solutions to determine the best one for them. Where applicable, definitions have been aligned with Cascale's Higg FEM How to Higg Guide.

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Introduction

Access to clean water is vital for people, the environment, agricultural and industrial activities. Sustainability reporting frameworks such as the European Sustainability Reporting Standards (ESRS), the Global Reporting Initiative (GRI) or the Carbon Disclosure Project (CDP) all include dedicated sections on water. The textile and wider fashion industry is a major water user and therefore has significant potential to reduce pressure on water resources, particularly in key production hubs, many of which are located in areas facing high water stress.

While wastewater quality is covered in the ZDHC Wastewater and Sludge Guidelines, this document addresses water use and efficiency in textile manufacturing. Reduced water use enhances resource efficiency, supporting a key aim of ZDHC's 2030 Impact Strategy. The amount of water used in a facility can be directly related to its wastewater quality.

Increased water efficiency can be realised through two main routes:

1. Greater efficiency through optimised processes (water-efficient machinery and/or chemistry, leakage control).
2. Recycling and reuse of water, e.g., through reuse of condensate, recycling of water through filtration, ultrafiltration and reverse osmosis or other technologies after the effluent treatment plant as well as rainwater collection and use.

This document provides process-specific benchmarks that can be calculated into facility-level benchmarks, based on weighting for each of the facility's processes. The measured water intensity per kg of production for the facility can be compared with the calculated industry benchmarks to trigger actions for improvements, where required. These water use benchmarks cover production and utility processes and exclude domestic water use. They were developed independently of the recycling of water as a measure to reach the listed benchmarks. To fully optimise water efficiency, particularly in areas with high water stress, both approaches (i.e. process efficiency optimisation and water recycling) should be considered in parallel.

The ZDHC Water Use Benchmarks for Textiles document is meant to help solve several issues:

- Allow facilities to better understand their industrial water use.
- Help reduce water use in textile manufacturing and, therefore, water stress.
- Provide an industry-specific, harmonised framework for water-use benchmarking in the textile industry, rather than individual, potentially conflicting requirements set by individual brands or retailers.
- Allow brands, retailers and suppliers to report on water use and set comparable, meaningful and realistic water use targets.
- Include water stewardship in the ZDHC Suppliers Roadmap to Zero Programme.
- Indirectly support facility efforts in energy efficiency and greenhouse gas reduction through water use reduction, which may also lead to reduced chemical use.

Scope

The ZDHC Water Use Benchmarks for Textiles document is designed to support improved water management and performance in textile wet processing. It provides a structured approach for facilities to evaluate and optimise water use in alignment with industry practices. It applies to textile facilities that perform in-house industrial wet processes and generate over 15 m^3/day of wastewater.

In scope

Wet processors, including:

- Dyehouses
- Garment laundries
- Printing facilities
- Textile wet processing
- Vertically integrated facilities
- Other manufacturing processes using water such as: washing of machines, laboratory usage or boiler operations

Out of scope

Facilities without wet processing, including:

- Coating, lamination, positional printing and sublimation/transfer printing facilities that do not generate effluent
- Cut Make Trim apparel manufacturers
- Dissolved grade pulp manufacturing
- Farming of fibres
- Footwear assembly
- Leather manufacturing
- Man-Made Cellulosic Fibres (MMCF) manufacturing
- Permanganate application facilities
- Polymer production
- Production of chemicals or mixing of chemical formulations for commercial sale
- Raw wool scouring facilities
- Textile accessories or trim manufacturers, e.g. zips, buttons, printed labels (plastic, metal, glass, shells etc.)

Definitions

For the purpose of industry alignment and harmonisation of tools, the broader water definitions from Cascale's HIGG FEM are used for the ZDHC Water Use Benchmark, while the benchmark methodology and values are specific to ZDHC.

For a full list of definitions, please also refer to the ZDHC Glossary

Water Sources

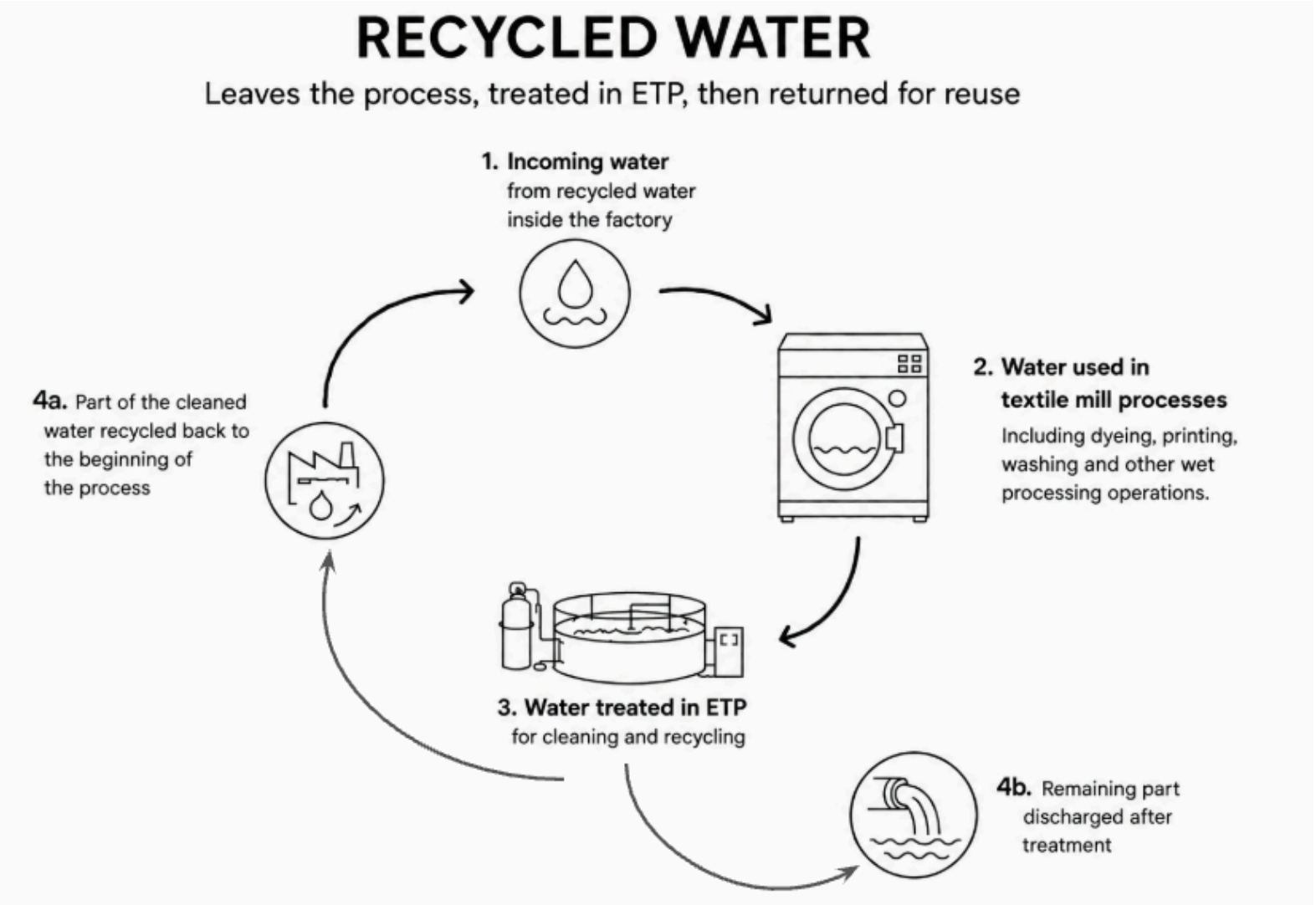
Table 1: Water Sources and Descriptions

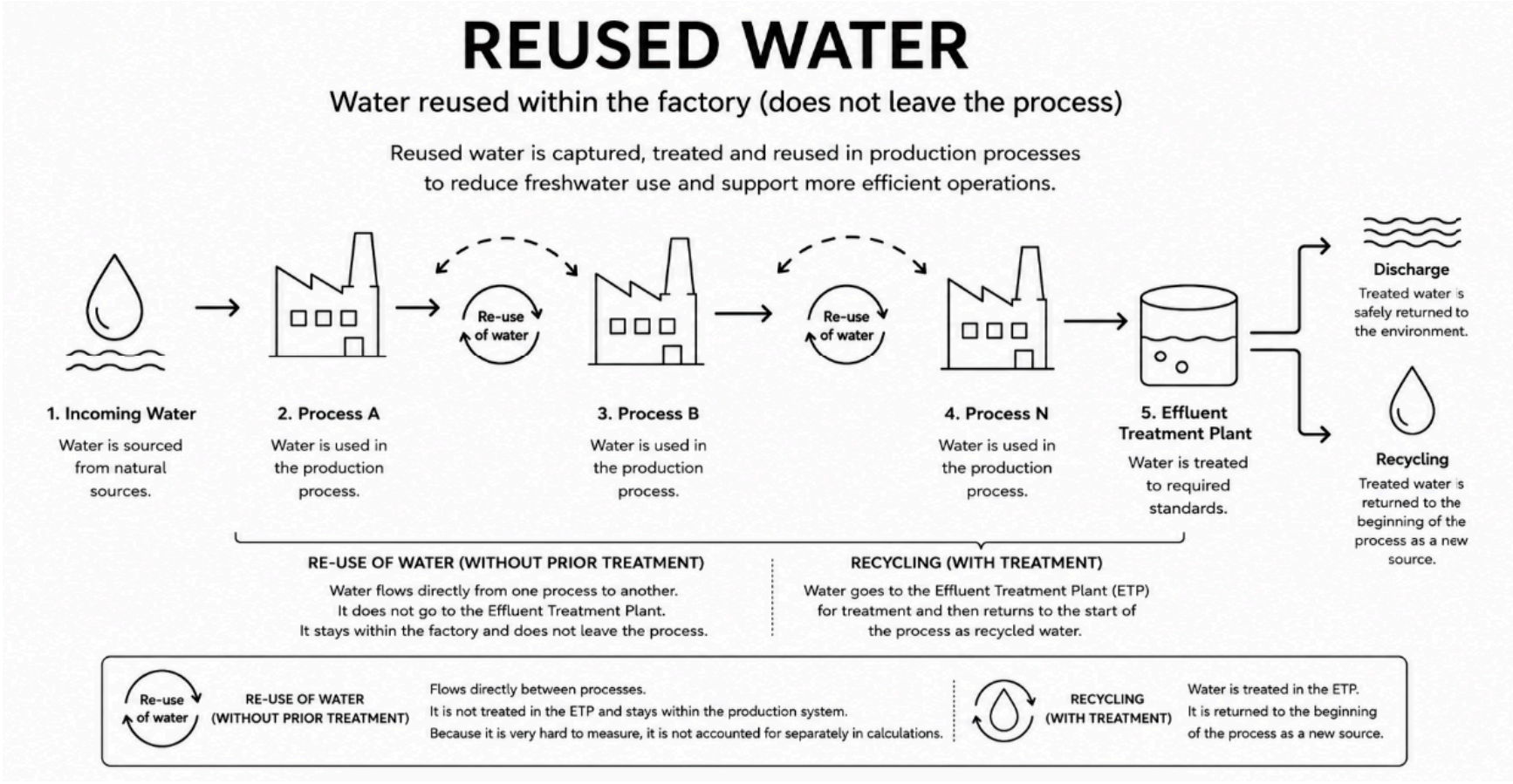
Water Source	Description
Blue water sources Blue water is fresh surface and groundwater, in other words, the water in freshwater lakes, rivers and aquifers.	
Surface water	Water that occurs naturally on the earth's surface (ice sheets/caps, glaciers, icebergs, ponds, lakes, rivers/streams, wetlands and bogs, etc.). Surface water has a low concentration of dissolved solids, is of an acceptable quality, and/or requires minimal treatment to be used for domestic, municipal or agricultural applications.
Groundwater	Water in soil beneath the surface, usually under conditions where the pressure in the water is greater than the atmospheric pressure and the soil voids are substantially filled with water. Non-renewable groundwater is generally located at deeper depths and cannot be replenished easily or is replenished over very long periods of time. They are sometimes referred to as 'fossil' groundwater sources.
Municipal Blue Water	Blue water provided by a municipality or other public provider.
Municipal Water (Origin Unknown)	Water provided by a municipality or other public provider with unknown origin (e.g. blue or grey water)
Brackish Surface Water/Seawater	Water in which the concentration of salts is relatively high (over 10,000 mg/l). For comparison, seawater has a typical concentration of salts above 35,000 mg/l. Brackish water is saltier than freshwater, but not as salty as seawater. It may result from mixing of seawater with freshwater, as in estuaries, but also certain human activities can produce brackish water. Brackish water is hostile to the growth of most terrestrial plant species.
Condensate from an External Source	Water that is generated from a condensate of steam sources that are not located at the facility.
Rainwater	Water in the form of precipitation (e.g. rain, snow) that is harvested within the facility either from the roof or other surfaces and stored for use.
Grey Water* Sources Water that has been polluted by human activity (e.g. industrial or domestic sources)	
Municipal Grey Water	Water provided by a municipality (e.g. wastewater generated by households, excluding toilet waste) or other public provider that generates grey water
Recycled Water	Wastewater that has been treated using physical chemical and/or any

	additional treatment processes to meet a quality which allows the water to be used again in a process or for domestic purposes. For example, wastewater that has gone through a membrane filtration process and used back in the industrial operation is considered recycled water.
Reused Water	Wastewater discharged from one process that is used directly in another process without treatment.
Treated Wastewater from External Sources	Wastewater that has been discharged and treated by an external source (e.g. another manufacturing facility) using physical, chemical and/or any additional treatment processes to meet a quality which allows the water to be used again in a process.
Untreated Wastewater from External Sources (treated internally)	Wastewater that has been discharged by an external source (e.g. another manufacturing facility) and treated at the supplier's facility using physical, chemical and/or additional treatment processes to meet a quality which allows the water to be used again in a process.

Source: Cascale Higg FEM How to Higg Guide 2025
(slightly modified by removing references to non-contact cooling water)

**Please note that these definitions of grey water are different to the Water Footprint Network definitions of grey water, that are estimates of the amount of water required to dilute discharged pollutants to background levels.*


RECYCLED WATER
Leaves the process, treated in ETP, then returned for reuse
1. Incoming water
from recycled water
inside the factory
2. Water used in
textile mill processes
Including dyeing, printing,
washing and other wet
processing operations.
3. Water treated in ETP
for cleaning and recycling
4a. Part of the cleaned
water recycled back to
the beginning of
the process
4b. Remaining part
discharged after
treatment


REUSED WATER
Water reused within the factory (does not leave the process)
Reused water is captured, treated and reused in production processes
to reduce freshwater use and support more efficient operations.
Re-use of water
Re-use of water
1. Incoming Water
Water is sourced from natural sources.
2. Process A
Water is used in the production process.
3. Process B
Water is used in the production process.
4. Process N
Water is used in the production process.
5. Effluent Treatment Plant
Water is treated to required standards.
Discharge
Treated water is safely returned to the environment.
Recycling
Treated water is returned to the beginning of the process as a new source.
RE-USE OF WATER (WITHOUT PRIOR TREATMENT)
Water flows directly from one process to another.
It does not go to the Effluent Treatment Plant.
It stays within the factory and does not leave the process.
RECYCLING (WITH TREATMENT)
Water goes to the Effluent Treatment Plant (ETP) for treatment and then returns to the start of the process as recycled water.
Re-use of water
RE-USE OF WATER (WITHOUT PRIOR TREATMENT)
Flows directly between processes.
It is not treated in the ETP and stays within the production system.
Because it is very hard to measure, it is not accounted for separately in calculations.
RECYCLING (WITH TREATMENT)
Water is treated in the ETP.
It is returned to the beginning of the process as a new source.

Chapter 1: Considerations for ZDHC Water Use Benchmarks

1.1 Water Use Benchmark Levels

In line with ZDHC's philosophy of continuous improvement, the Water Use Benchmarks are categorised into four levels: 0, 1, 2 and 3 (level 3 to be added at a later stage), helping facilities assess their water use intensity against industry-reviewed benchmarks, compare their performance with industry peers and identify potential improvement areas.

These benchmarks are defined based on the industrial processes in use, regardless of whether the facility recycles water.

- **Level 0**

This entry level is designed for facilities beginning their water-efficiency journey, enabling them to establish a water-use baseline. As facilities in the textile sector will become familiar with this benchmarking tool and improve their water efficiency, it is planned to remove the entry level (Level 0) over time.

- **Level 1**

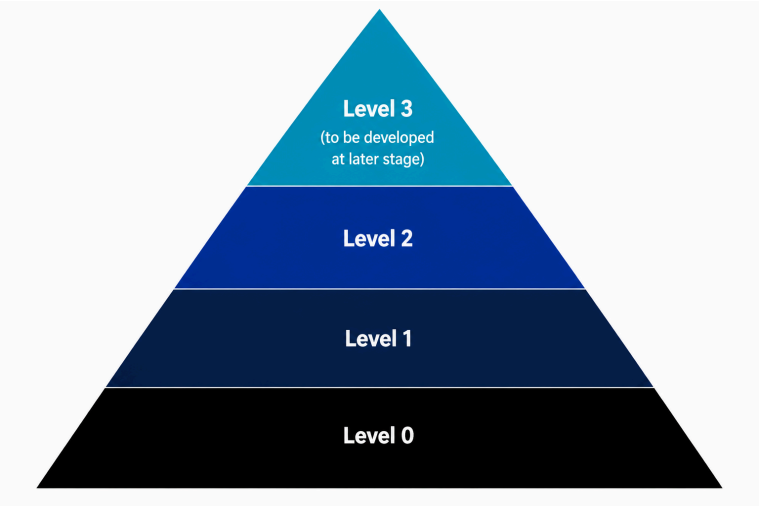
This level indicates that facilities have systems in place to monitor, manage and improve their water use.

- **Level 2**

This level indicates that facilities have an advanced management of water use.

- **Level 3 (to be added later)**

Facilities at this level are leading the industry in water efficiency, using the best available technologies and practices. The benchmark requirements for this level will be developed in the future and once this level is ready, level 0 will be removed, resulting in three levels (level 1, level 2 and level 3).



1.2 Explanation of the Water Use Benchmarks Methodology

The ZDHC Water Use Benchmarks were developed for more than 200 types of wet processes across various substrates and compositions. Process variables such as depth of shade, liquor ratio or pick-up, fibre absorption and fibre composition were considered during the development of this document.

In addition, the benchmarks include water use for machine cleaning, boilers and water softener consumption. They also consider inefficiencies such as liquor ratio variation, colour adjustments and reprocesses, along with factors such as print paste preparation, auxiliary tank cleaning and washing-off deviations.

An explanation of the assumptions used in the calculation of the ZDHC Water Use Benchmarks is provided in Appendix A and Appendix B.

For the purpose of this document, the following types of water are differentiated[1]:

Inlet Water

All sources of incoming (inlet) water entering the facility from public water networks, rivers, lakes, groundwater or other external water sources such as tankers. Inlet water excludes water that has been recycled (internally or externally) and gives a measure of water extraction.

Inlet water is typically equal to blue water, as defined in detail in the Cascale How to Higg Guide, but can also include municipal grey water or wastewater from external sources.

[1] Definitions largely aligned with Cascale Higg FEM How to Higg Guide, only exception is non-contact cooling water, which Higg defines as domestic water, while this document defines it as part of Production Process Water

Production Process Water

Water that is used throughout manufacturing processes and operations to produce goods, including for dyeing, rinsing, steam generation, mixtures applied to the product and cleaning equipment, components or tools that come into contact with the product during manufacturing. Production Process Water includes recycled water as well as non-contact cooling water (unless the non-contact cooling water is already counted as recycled water).

Domestic Water

Water used for washrooms, sanitation, drinking, food preparation, landscape irrigation, etc. Domestic water use is excluded from the Water Use Benchmarks.

Recycled Water

Please refer to the definition of recycled water in the table above.

Note: Water recycled for non-process use cases, i.e. sanitary use or gardening, will become domestic water for the purpose of this Water Use Benchmark document.

Reused Water

Please refer to the definition of Reused Water in the table above.

To avoid complexity, reused water will not be calculated separately for the indicators used in the Water Use Benchmark. However, reusing water will automatically lower the water intensity of the facility and therefore contribute to performing better against the Benchmarks.

Discharged Water

Water that leaves the facility at the end of the process and is discharged back into public water networks, rivers, streams, lakes, etc. Discharged water data is not needed for the calculation of the Water Use Benchmarks, but will be required for a facility's water balance and to identify potential bypasses, as well as to calculate water consumption figures.

1.3 Calculation of Facility Water Intensity

For the calculation of the water use, only actual metered water use data can be used. Estimated water use data cannot be considered. Only exceptions are water delivered by lorries/tankers and externally recycled water, for which invoices can be accepted, and domestic water which can be estimated using the method detailed below.

Water use is measured in m^3/day or their equivalents. For benchmarking purposes, water use is normalised to production units and measured in litres per kilogram (litres/kg), representing the amount of water used in wet processing and utilities (e.g. boiler and water softening) to produce one kilogram of product.

Depending on the intention, the indicators of Inlet Water Intensity or Process Water Intensity can be used. While Inlet Water Intensity measures the overall water efficiency of the whole facility and takes into consideration water recycling, Process Water Intensity measures the

efficiency of the wet processes carried out in the facility, independent of water recycling. For facilities that do not recycle water, both indicators will show the same figure. To allow comparability across facilities and brands, Inlet Water Intensity will be used as the lead indicator for the purpose of classifying a facility into water use conformance levels.

Inlet Water Intensity Calculation:

$$\text{Inlet Water Intensity (l/kg)} = \frac{\text{Inlet Water (l) - Domestic Water (l)}}{\text{Wet Process Production (kg)}}$$

For example:

Inlet Water: 200,000 l/day

Domestic Water use: 20,000 l/day

Wet Process Production: 1,000 kg/day

Inlet Water Intensity Baseline = (200,000 l - 20,000 l)/1,000 kg/day

Inlet Water Intensity Baseline = 180 l/kg

Inlet Water Intensity accounts only for incoming water and is therefore a measure for the water extraction and total water efficiency of a facility. Recycling or reuse of water within the factory boundaries will improve the performance of Inlet Water Intensity. Inlet Water Intensity is an important indicator for facilities operating in water scarce areas.

Process Water Intensity

Process Water Intensity can be used to measure water efficiency in terms of process optimisation, independent of the percentage of water recycled by the facility. To achieve this sole focus on process efficiency, any recycled water needs to be added to the calculation.

$$\text{Process Water Intensity (l/kg)} = \frac{\text{Inlet Water (l) + Recycled Water (l) – Dom. Water (l)}}{\text{Wet Process Production (kg)}}$$

For the same example and a water recycling rate of 20%:

Inlet Water: 200,000 l/day

Recycled Water: 40,000 l/day

Domestic Water use: 20,000 l/day

Wet Process Production: 1,000 kg/day

Process Water Intensity = (200,000 l/day + 40,000 l/day – 20,000 l/day)/1,000 kg/day

Process Water Intensity = 220 l/kg

Since Process Water Intensity measures water use in industrial processes independent of water recycling, it can be used by facilities that wish to measure and increase their process efficiency, which may also help to increase energy efficiency and reduce chemical usage.

Recording Water Usage

Accurate records of water use and production data are a prerequisite for any facility to compare their water use per unit production against the water benchmarks.

Cascale's Higg FEM How to Higg Guide lists the following principles for reliable water tracking and reporting:

Completeness
The tracking and reporting programme should include all relevant sources. Sources should not be excluded from data tracking.

Accuracy
Ensure that the data input into the water tracking programme is accurate and is exclusively derived from calibrated flow meter readings.

Consistency
Use consistent methodologies to track water data that allows for comparisons of water use over time. If there are any changes in the tracking methods, water sources or other operations that impact water use data, this should be documented.

Transparency
All data sources (e.g., water bills, meter readings, etc.) and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.

Data Quality Management
Quality assurance activities (internal or external data quality checks) should be defined and performed on water data as well as the processes used to collect and track data to ensure reported data is accurate.

Source: Cascale Higg FEM How to Higg Guide 2025
For more detailed information, please refer to the Cascale How to Higg Guide.

Inlet water

To be able to calculate the water use figures, it is essential that water use is recorded by the facility in a reliable way and separately for the main processes and domestic use. Facilities must identify all sources of inlet (incoming) water (water from public water systems, rivers, lakes, groundwater, rainwater, etc.) and record the volume from each source in m^3/day or equivalent.

Facilities are required to install flow meters to enable accurate, real-time measurement of water usage, supporting effective monitoring and management of water consumption. 12 months of records are needed for water benchmarking to cover all seasons.

In general, flow meters should ensure that water consumption data can be obtained from all production areas and utilities. The ultimate goal is to measure consumption per process to identify water consumption hotspots.

If the facility is treating incoming water, it is necessary to install flow meters to measure the following:

- Inflow into treatment systems
- Treated water output for facility use
- Rejected water returned to the sources

Production Process Water Use

Facilities should track water use separately for:

- Manufacturing processes (e.g., dyeing, printing, finishing, machine cleaning, boiler operations and water used for resin regeneration (backwash), if applicable).
- Production water, including process and utilities water use.

It is mandatory to install flow meters to accurately measure facility water use. In addition, it is recommended to install separate flow meters for the main production processes to attribute water consumption to individual processes, identify hotspots and be able to track savings on a process level.

Note: The correct positioning of water meters is important. They should not be placed on pipes that carry *both* process water *and* machine cooling water as this will give inaccurate results.

Domestic water use

- Domestic processes (e.g. toilets, kitchen/canteen, gardening, staff dormitories, emergency response storage, etc.)
- When domestic water is not measured by flow meters, the facility can estimate domestic water use by assuming 25 litres per employee and day. This estimated use will be

deducted from total water used and the remaining water use will be compared against the water use benchmarks.

Table 2: Water use consideration for manufacturing processes

Production Processes	Considerations for Water Use Calculation
• Dyeing • Printing • Finishing • Washing	Water that is: • Used for wet processing • Used for the preparation of chemicals that are used in the wet processing operations • Used for reprocessing • Recycled and reused in the wet processing operation
• Machine cleaning • Laboratory	Water that is: • Used for cleaning the wet processing machines • Used in laboratories
• Boiler operations • Water softening process	• Water that is used for (non-contact) cooling • Water used for steam production • Backwash water • Rejected water from the water softening process • Boiler Blowdowns • Condensates

Recording production

To normalise water use per production unit, it is also important to use accurate and comparable production figures. The total volume of goods produced and shipped in the calendar year, expressed in kilograms or equivalent, should be used for wet-process production calculations.

Total production (kg) = total production delivery notes (kg)

If production data is maintained in square metres or linear metres, it needs to be converted to total kilograms before calculating.

Where production is measured in number of pieces, the following formula should be used to convert into kg:

$$\text{Total production (kgs)} = \frac{\text{Avg. weight (grams/piece) X total number of pieces}}{\text{1000 (g/kg)}}$$

In case production is measured in metres, the following formula can be used to convert this into kgs:

$$\text{Total production (kgs)} = \frac{\text{GLM* (g/m) X length (m)}}{\text{1000 (g/kg)}}$$

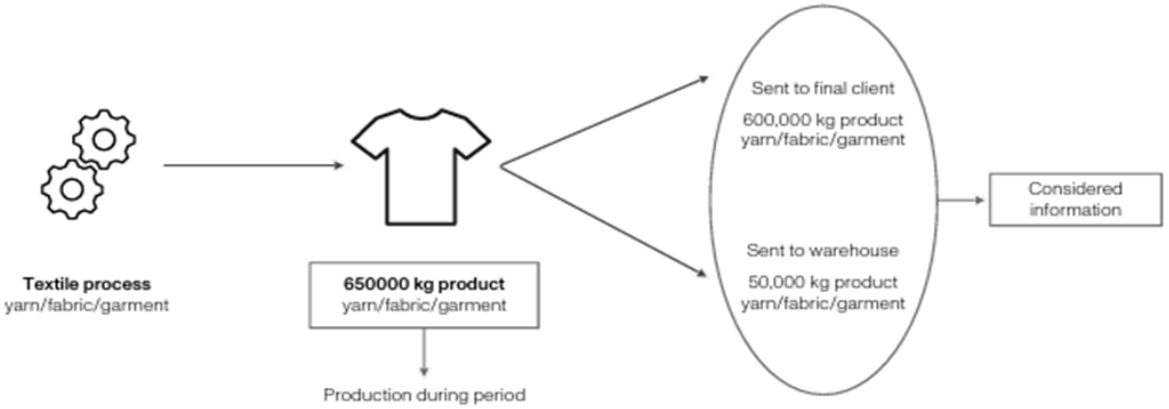
* GLM = GSM (g/m^2) X width (m)

Table 3: Types of goods

Type of goods data	Definition
Produced goods data	This refers to the total quantity of (fit for purpose) goods that are produced over the span of 12 months in each department. Quantities of reprocessing and volumes of downgraded products must not be included in the calculation.

To calculate water use benchmarks, production data must be supported by evidence:

- Total finished goods produced register
- Delivery notes register
- Delivery notes (these should be anonymised by the facility before being shared (including, but not limited to, name, address and data from third parties, as well as prices))
- Stock volume register (if applicable)
- Stock movements register (if applicable)



Example of production data collection

If production data is unavailable, production volume cannot be estimated and facility water use benchmarks cannot be determined.

Chapter 2: Benchmarking the Facility-Level Water Use

Table 6 (below) lists the water use benchmark for each wet process, substrate and composition that can be part of the facility operations. A facility may be doing multiple processes, and therefore, it is important to calculate the applicable facility-level water use benchmark based on the combination of these processes.

The applicable facility-level water use benchmark for multiple processes is calculated from the formula:

(% of process 1 X benchmark for process 1) + (% of process 2 X benchmark for process 2) + (% of process 3 x.....

For example, a facility is performing the following 2 processes:

Table 4: Example of Calculation

Process	% performed	Process Water Use Benchmarks		
		Level 0 (L/kg)	Level 1 (L/kg)	Level 2 (L/kg)
Exhaust pre-treatment + exhaust reactive dyeing (yarn- cotton)	50	116	88	76
Exhaust pre-treatment + exhaust dyeing (fabric- lycocell)	50	121	93	81
Water use (Inlet Water Intensity) measured by facility = 89 litres/kg				

Based on the above facility-level benchmarks, the facility's Inlet Water Intensity is at Level 1

The applicable level 0 facility benchmark is calculated as:

(0.5 x 116) +(0.5 x 121) = 118.5 litres/kg

The applicable level 1 facility benchmark is calculated as:

(0.5 x 88) + (0.5 x 93) = 90.5 litres/kg

The applicable level 2 facility benchmark is calculated as:

(0.5 x 76) + (0.5x 81) = 78.5 litres/kg

A similar calculation can be made for Process Water Intensity, although Inlet Water Intensity is the lead indicator for comparison against the water use benchmark levels.

ZDHC Water Use Benchmarks for Textiles

The total number of processes defined for the water use benchmarks can be combined into 11 groups for textiles, which are as follows:

Table 5: Summary of Total Wet Processes Considered for Water Use Benchmarks

Group of Processes	Number of Processes
Pre-treatment	28
Continuous dyeing with pre-treatment	9
Continuous dyeing without pre-treatment	7
Indigo continuous dyeing	4
Exhaust dyeing with pre-treatment	56
Exhaust dyeing without pre-treatment	22
Washing and finishing	11
Conventional printing with pre-treatment	24
Conventional printing without pre-treatment	23
Digital printing with pre-treatment	24
Digital printing without pre-treatment	14
Total number of processes	***222***

The ZDHC Water Use Benchmarks for Textile at level 0, 1 and 2 are detailed in Table 6. Equivalencies for additional materials are given in Table 7.

Table 6: Water Use Benchmarks for Textile Facilities at 3 Levels

Sr.No	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
1	Pre-treatment	Continuous pre-treatment (Mercerised)	Fabric	Cotton	58	42	35
2	Pre-treatment	Continuous pre-treatment (Non-mercerised)	Fabric	Cotton	45	31	25
3	Pre-treatment	Continuous pre-treatment	Fabric	Viscose	37	24	19
4	Pre-treatment	Continuous pre-treatment	Fabric	Lyocell	37	24	19
5	Pre-treatment	Continuous pre-treatment	Fabric	Polyester	37	24	19
6	Pre-treatment	Continuous pre-treatment	Fabric	Polyester/cotton	45	31	25
7	Pre-treatment	Continuous pre-treatment	Fabric	Polyester/viscose	37	24	19
8	Pre-treatment	Continuous pre-treatment yarn-dyed	Fabric	All fibres	37	24	19
9	Pre-treatment	Exhaust pre-treatment	Fabric	Cotton	59	43	36
10	Pre-treatment	Exhaust pre-treatment	Fabric	Viscose	54	38	32
11	Pre-treatment	Exhaust pre-treatment	Fabric	Lyocell	53	37	31
12	Pre-treatment	Exhaust pre-treatment	Fabric	Polyester	49	34	28
13	Pre-treatment	Exhaust pre-treatment	Fabric	Acetate	49	34	28

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
14	Pre-treatment	Exhaust pre-treatment	Fabric	Polyester/cotton	55	39	33
15	Pre-treatment	Exhaust pre-treatment	Fabric	Polyester/viscose	47	33	27
16	Pre-treatment	Exhaust pre-treatment	Fabric	Polyamide	49	34	28
17	Pre-treatment	Exhaust pre-treatment	Fabric	Acrylic/cotton	47	33	27
18	Pre-treatment	Exhaust pre-treatment	Fabric	Wool	53	37	31
19	Pre-treatment	Exhaust pre-treatment	Fabric	Wool/cotton	66	48	42
20	Pre-treatment	Exhaust pre-treatment	Fabric	Wool/viscose	53	37	31
21	Pre-treatment	Exhaust pre-treatment	Fabric	Wool/polyester	53	38	32
22	Pre-treatment	Exhaust pre-treatment	Fabric	Wool/polyamide	53	38	32
23	Pre-treatment	Exhaust pre-treatment	Fabric	Silk	97	75	67
24	Pre-treatment	Exhaust pre-treatment, yarn-dyed	Fabric	All fibres	46	32	26
25	Pre-treatment	Exhaust Pre-treatment Mercerisation (Hank)	Yarn	Cotton	64	47	41
26	Pre-treatment	Pre-washing of yarn dyed	Fabric	All fibres	20	14	9
27	Pre-treatment	Pre-washing before thermofixation	Fabric	Polyester	20	14	9
28	Pre-treatment	Pre-washing before thermofixation	Fabric	Polyamide	20	14	9
29	Continuous dyeing with pre-treatment	Continuous pre-treatment + continuous dyeing (Mercerised and Non-mercerised)	Fabric	Cotton	98	77	62
30	Continuous Dyeing with Pre-treatment	Continuous pre-treatment + continuous dyeing	Fabric	Viscose	72	55	43

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
31	Continuous Dyeing with Pre-treatment	Continuous pre-treatment + continuous dyeing	Fabric	Lyocell	72	55	43
32	Continuous Dyeing with Pre-treatment	Continuous pre-treatment + continuous dyeing	Fabric	Polyester	67	50	40
33	Continuous Dyeing with Pre-treatment	Continuous pre-treatment + continuous dyeing	Fabric	Polyester/cotton	82	64	51
34	Continuous Dyeing with Pre-treatment	Continuous pre-treatment + continuous dyeing	Fabric	Polyester/viscose	72	55	43
35	Continuous Dyeing with Pre-treatment	Continuous Pre-Treatment + Continuous Pigment Dyeing	Fabric	All fibres	83	65	51
36	Continuous Dyeing with Pre-treatment	Continuous Pre-treatment + Continuous Overdyeing Denim	Fabric	Cotton	102	80	65
37	Continuous Dyeing with Pre-treatment	Continuous Pre-treatment + Continuous Overdyeing Denim	Fabric	Lyocell	102	80	65
38	Continuous Dyeing without Pre-treatment	Continuous dyeing	Fabric	Cotton	68	59	44
39	Continuous Dyeing without Pre-treatment	Continuous dyeing	Fabric	Viscose	52	43	31
40	Continuous Dyeing without Pre-treatment	Continuous dyeing	Fabric	Lyocell	52	43	31
41	Continuous Dyeing without Pre-treatment	Continuous dyeing	Fabric	Polyester	47	38	28

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
42	Continuous Dyeing without Pre-treatment	Continuous dyeing	Fabric	Polyester/cotton	52	46	33
43	Continuous Dyeing without Pre-treatment	Continuous dyeing	Fabric	Polyester/viscose	52	43	31
44	Continuous Dyeing without Pre-treatment	Continuous Pigment Dyeing	Fabric	All fibres	65	47	34
45	Indigo Continuous Dyeing	Continuous pre-treatment + continuous indigo dyeing	Yarn	Cotton	88	68	55
46	Indigo Continuous Dyeing	Continuous pre-treatment + continuous indigo dyeing + fabric desizing	Yarn/fabric	Cotton	98	77	62
47	Indigo Continuous Dyeing	Continuous pre-treatment + continuous indigo dyeing	Yarn	Lyocell	81	62	50
48	Indigo Continuous Dyeing	Continuous pre-treatment + continuous indigo dyeing + fabric desizing	Yarn/fabric	Lyocell	95	74	60
49	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Reactive Dyeing (Package)	Yarn/staple/ tops	Cotton	116	88	76
50	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust VAT dyeing (package)	Yarn	Cotton	109	82	71

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
51	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn/Staple/ tops	Viscose	107	80	69
52	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn/Staple/ tops	Lyocell	107	80	69
53	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn/Staple/ tops	Polyester	87	64	53
54	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn	Polyester/cotton	142	110	96
55	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn	Polyester/viscose	133	103	89
56	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn/staple	Polyamide	97	72	61
57	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn/staple/ tops	Acrylic	62	43	35
58	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn	Acrylic/cotton	124	95	82
59	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn/staple	Wool	140	107	93
60	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Tops	Wool	140	107	93

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
61	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn	Wool/cotton	140	107	93
62	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn	Wool/viscose	126	95	82
63	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn	Wool/polyester	129	99	84
64	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (package)	Yarn	Wool/polyamide	129	99	84
65	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (hank)	Yarn	Silk	249	196	174
66	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing (hank)	Yarn	Wool	233	182	162
67	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Cotton	252	198	175
68	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Viscose	200	155	136
69	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Lyocell	200	155	136
70	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Polyester	180	138	121
71	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Polyester/Cotton	260	205	182

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
72	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Polyester/Viscose	232	182	161
73	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Polyamide	207	161	141
74	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Acrylic	125	92	79
75	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Wool/Cotton	265	209	186
76	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Wool/Viscose	233	182	162
77	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Wool/Polyester	238	186	165
78	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Dyeing (Hank)	Yarn	Wool/Polyamide	238	186	165
79	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Cotton	113	86	75
80	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Viscose	116	88	77
81	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Lyocell	121	93	81

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
82	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Polyester	84	62	52
83	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Acetate	84	62	52
84	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Polyester/cotton	129	100	87
85	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Polyester/viscose	105	79	69
86	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Polyamide	94	70	60
87	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Acrylic/cotton	121	93	81
88	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Wool	137	105	92
89	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Wool/cotton	137	105	92
90	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Wool/viscose	123	93	81

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
91	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Wool/polyester	126	96	83
92	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Wool/polyamide	126	99	83
93	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Fabric	Silk	249	196	174
94	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Overdyeing Denim	Fabric	Cotton	113	86	75
95	Exhaust Dyeing with Pre-treatment	Exhaust Pre-treatment + Exhaust Overdyeing Denim	Fabric	Lyocell	121	93	81
96	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Cotton	139	107	94
97	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Lyocell	128	98	85
98	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Viscose	116	88	77
99	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Polyester	99	74	64
100	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Polyamide	99	74	64
101	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Polyester/cotton	183	144	127

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
102	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Polyester/viscose	145	112	99
103	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Acrylic	97	71	61
104	Exhaust Dyeing with Pre-treatment	Exhaust pre-treatment + exhaust dyeing	Garment	Wool	132	100	87
105	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Cotton	89	62	51
106	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Viscose	91	63	52
107	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Lyocell	97	69	57
108	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Polyester	63	41	31
109	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Acetate	63	41	31
110	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Polyester/cotton	104	74	62

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
111	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Polyester/viscose	85	59	49
112	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Polyamide	73	49	39
113	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Acrylic/cotton	101	73	61
114	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Wool	113	81	68
115	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Wool/cotton	103	71	58
116	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Wool/viscose	99	69	57
117	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Wool/polyester	102	71	59
118	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Wool/polyamide	102	71	59
119	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Fabric	Silk	191	138	116

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
120	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Garment	Cotton	103	77	66
121	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Garment	Viscose	103	77	66
122	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Garment	Lyocell	103	77	66
123	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Garment	Polyester	84	61	52
124	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Garment	Polyamide	84	61	52
125	Exhaust Dyeing without Pre-treatment	Exhaust dyeing	Garment	Polyester/cotton	143	110	97
126	Exhaust dyeing without pre-treatment	Exhaust dyeing	Garment	Polyester/viscose	131	100	87
127	Washing/finishing*	Continuous washing	Fabric	All fibres	30	24	19
128	Washing/finishing*	Exhaust washing	Fabric	All fibres	41	30	25
129	Washing/finishing*	Laundry (soft wash)	Garment	All fibres	47	35	28
130	Washing/finishing*	Laundry (chemical wash)	Garment	All fibres	58	44	37

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
131	Washing/finishing*	Denim laundry	Garment	All fibres	101	85	74
132	Washing/finishing*	Finishing by stenter	Fabric	All fibres	15	9	4
133	Washing/finishing*	Finishing by sanfor	Fabric	All fibres	2	2	2
134	Washing/finishing*	Anti-shrink treatment	Tops	Wool	71	57	50
135	Washing / Finishing*	Continuous Washing	Fabric	Wool	41	35	30
136	Washing / Finishing*	Milling/Felting	Fabric	Wool	50	37	30
137	Washing / Finishing*	Steaming/Decatising	Fabric	Wool	5	5	5
138	Conventional printing with pre-treatment	Continuous pre-treatment + continuous pigment printing	Fabric	Cotton	58	44	39
139	Conventional printing with pre-treatment	Continuous pre-treatment + continuous pigment printing	Fabric	Viscose	49	37	32
140	Conventional printing with pre-treatment	Continuous pre-treatment + continuous pigment printing	Fabric	Lyocell	49	37	32
141	Conventional printing with pre-treatment	Continuous pre-treatment + continuous pigment printing	Fabric	Polyester	49	37	32
142	Conventional printing with pre-treatment	Continuous pre-treatment + continuous pigment printing	Fabric	Polyester/cotton	58	44	39
143	Conventional printing with pre-treatment	Continuous pre-treatment + continuous pigment printing	Fabric	Polyester/viscose	49	37	32

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
144	Conventional printing with pre-treatment	Continuous pre-treatment + continuous reactive printing + continuous wash off	Fabric	Cotton	132	105	90
145	Conventional printing with pre-treatment	Continuous pre-treatment + continuous reactive printing + continuous wash off	Fabric	Viscose	106	83	71
146	Conventional printing with pre-treatment	Continuous pre-treatment + continuous reactive printing + continuous wash off	Fabric	Lyocell	114	90	77
147	Conventional printing with pre-treatment	Continuous pre-treatment + continuous reactive printing + continuous wash off	Fabric	Polyester	96	75	64
148	Conventional printing with pre-treatment	Exhaust pre-treatment + continuous pigment printing	Fabric	Cotton	66	52	45
149	Conventional printing with pre-treatment	Exhaust pre-treatment + continuous pigment printing	Fabric	Viscose	68	53	46
150	Conventional printing with pre-treatment	Exhaust pre-treatment + continuous pigment printing	Fabric	Lyocell	66	52	45
151	Conventional printing with pre-treatment	Exhaust pre-treatment + continuous pigment printing	Fabric	Polyester	62	48	42
152	Conventional printing with pre-treatment	Exhaust pre-treatment + continuous pigment printing	Fabric	Polyester/cotton	68	53	47
153	Conventional printing with pre-treatment	Exhaust pre-treatment + continuous pigment printing	Fabric	Polyester/viscose	61	47	41
154	Conventional printing with pre-treatment	Exhaust pre-treatment + continuous reactive printing + continuous wash off	Fabric	Cotton	126	100	86

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
155	Conventional Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Reactive Printing + Continuous Wash Off	Fabric	Viscose	128	102	87
156	Conventional Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Reactive Printing + Continuous Wash Off	Fabric	Lyocell	135	107	92
157	Conventional Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Disperse Printing + Continuous Wash Off	Fabric	Polyester	111	88	75
158	Conventional Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Disperse Printing + Continuous Wash Off	Fabric	Acetate	111	88	75
159	Conventional Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Acid Printing + Continuous Wash Off	Fabric	Polyamide	138	110	94
160	Conventional Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Acid Printing + Continuous Wash Off	Fabric	Wool	143	114	98
161	Conventional Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Acid Printing + Continuous Wash Off	Fabric	Silk	201	162	138
162	Conventional Printing without Pre-treatment	Vigoreaux printing + Continuous Wash Off	Tops	Wool	51	37	31
163	Conventional Printing without Pre-treatment	Vigoreaux printing + Continuous Wash Off	Tops	Acrylic	51	37	31
164	Conventional Printing without Pre-treatment	Continuous Pigment Printing	Fabric	Cotton	44	30	23

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
165	Conventional Printing without Pre-treatment	Continuous Pigment Printing	Fabric	Viscose	45	30	23
166	Conventional Printing without Pre-treatment	Continuous Pigment Printing	Fabric	Lyocell	44	30	23
167	Conventional Printing without Pre-treatment	Continuous Pigment Printing	Fabric	Polyester	43	29	23
168	Conventional Printing without Pre-treatment	Continuous Pigment Printing	Fabric	Polyester/Cotton	45	30	23
169	Conventional Printing without Pre-treatment	Continuous Pigment Printing	Fabric	Polyester/Viscose	43	29	23
170	Conventional Printing without Pre-treatment	Continuous Reactive Printing + Continuous Wash Off	Fabric	Cotton	116	89	74
171	Conventional Printing without Pre-treatment	Continuous Reactive Printing + Continuous Wash Off	Fabric	Viscose	105	79	64
172	Conventional Printing without Pre-treatment	Continuous Reactive Printing + Continuous Wash Off	Fabric	Lyocell	113	85	70
173	Conventional Printing without Pre-treatment	Continuous Disperse Printing + Continuous Wash Off	Fabric	Polyester	92	69	56
174	Conventional Printing without Pre-treatment	Continuous Disperse Printing + Continuous Wash Off	Fabric	Acetate	92	69	56

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
175	Conventional Printing without Pre-treatment	Continuous Acid Printing + Continuous Wash Off	Fabric	Polyamide	119	91	75
176	Conventional Printing without Pre-treatment	Continuous Acid Printing + Continuous Wash Off	Fabric	Silk	145	106	82
177	Conventional Printing without Pre-treatment	Continuous Acid Printing + Continuous Wash Off	Fabric	Wool	104	81	69
178	Conventional Printing without Pre-treatment	Continuous Dye Discharge Printing + Continuous Wash Off	Fabric	Cotton	87	67	57
179	Conventional Printing without Pre-treatment	Continuous Dye Discharge Printing + Continuous Wash Off	Fabric	Viscose	87	67	57
180	Conventional Printing without Pre-treatment	Continuous Dye Discharge Printing + Continuous Wash Off	Fabric	Lyocell	95	74	63
181	Conventional Printing without Pre-treatment	Continuous Dye Discharge Printing + Continuous Wash Off	Fabric	Polyester	77	59	50
182	Conventional Printing without Pre-treatment	Continuous Dye Discharge Printing + Continuous Wash Off	Fabric	Polyamide	104	81	69
183	Conventional Printing without Pre-treatment	Continuous Dye Discharge Printing + Continuous Wash Off	Fabric	Silk	104	81	69
184	Conventional Printing without Pre-treatment	Continuous Pigment Discharge Printing	Fabric	All fibres	61	46	39

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
185	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Pigment Digital Printing	Fabric	Cotton	53	39	33
186	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Pigment Digital Printing	Fabric	Viscose	45	31	26
187	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Pigment Digital Printing	Fabric	Lyocell	45	31	26
188	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Pigment Digital Printing	Fabric	Polyester	45	31	26
189	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Pigment Digital Printing	Fabric	Polyester/Cotton	53	39	33
190	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Pigment Digital Printing	Fabric	Polyester/Viscose	45	31	26
191	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Cotton	118	91	77
192	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Viscose	91	69	58
193	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Lyocell	98	75	63

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
194	Digital Printing with Pre-treatment	Continuous Pre-treatment + Continuous Disperse Digital Printing + Continuous Wash Off	Fabric	Polyester	83	62	52
195	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Pigment Digital Printing	Fabric	Cotton	62	46	39
196	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Pigment Digital Printing	Fabric	Viscose	63	47	41
197	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Pigment Digital Printing	Fabric	Lyocell	62	46	39
198	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Pigment Digital Printing	Fabric	Polyester	57	42	36
199	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Pigment Digital Printing	Fabric	Polyester/Cotton	64	48	41
200	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Pigment Digital Printing	Fabric	Polyester/Viscose	56	41	35
201	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Cotton	112	86	73
202	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Viscose	113	88	74
203	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Lyocell	118	92	77

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
204	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Disperse Digital Printing + Continuous Wash Off	Fabric	Polyester	98	75	63
205	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Disperse Digital Printing + Continuous Wash Off	Fabric	Acetate	98	75	63
206	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Acid Digital Printing + Continuous Wash Off	Fabric	Polyamide	120	93	79
207	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Acid Digital Printing + Continuous Wash Off	Fabric	Wool	125	97	82
208	Digital Printing with Pre-treatment	Exhaust Pre-treatment + Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Silk	169	134	113
209	Digital printing without Pre-treatment	Continuous Pigment Digital Printing	Fabric	Cotton	35	21	15
210	Digital printing without Pre-treatment	Continuous Pigment Digital Printing	Fabric	Viscose	38	22	16
211	Digital printing without Pre-treatment	Continuous Pigment Digital Printing	Fabric	Lyocell	38	22	15
212	Digital printing without Pre-treatment	Continuous Pigment Digital Printing	Fabric	Polyester	36	21	15
213	Digital printing without Pre-treatment	Continuous Pigment Digital Printing	Fabric	Polyamide	36	21	15

Table 6 continued

Sr No.	Process Group	Process Name	Substrate	Composition Fibre	Water Consumption L/kg (Level 0)	Water Consumption L/kg (Level 1)	Water Consumption L/kg (Level 2)
214	Digital printing without Pre-treatment	Continuous Pigment Digital Printing	Fabric	Polyester/Cotton	38	22	16
215	Digital printing without Pre-treatment	Continuous Pigment Digital Printing	Fabric	Polyester/Viscose	36	21	15
216	Digital printing without Pre-treatment	Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Cotton	100	73	59
217	Digital printing without Pre-treatment	Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Viscose	88	63	49
218	Digital printing without Pre-treatment	Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Lyocell	94	68	53
219	Digital printing without Pre-treatment	Continuous Disperse Digital Printing + Continuous Wash Off	Fabric	Polyester	77	54	42
220	Digital printing without Pre-treatment	Continuous Disperse Digital Printing + Continuous Wash Off	Fabric	Acetate	77	54	42
221	Digital printing without Pre-treatment	Continuous Acid Digital Printing + Continuous Wash Off	Fabric	Polyamide	99	72	58
222	Digital printing without Pre-treatment	Continuous Reactive Digital Printing + Continuous Wash Off	Fabric	Silk	111	76	55

*Note on finishing: If finishing is a standalone process, then the finishing values mentioned in the above table will apply. If a facility already has integrated dyeing and finishing processes, the finishing values are already included in the dyeing process for calculation purposes, so there is no need to double-count the finishing process in the calculation of water use benchmarks.

Appendix A - Fibre Equivalence

Fibre equivalence = fibres that can be treated as interchangeable (or grouped together) for dyeing purposes. For example, for hemp, the same water use benchmark figures can be used as for cotton.

Table 7: Fibre Equivalence[2] for Dyeing Processes

Sr.No	Fibre/Fibre Blend	Equivalent for Dyeing
1	Acrylic/modacrylic	Acrylic
2	Acrylic/polyamide	Wool/polyester
3	Acrylic/viscose	Acrylic/cotton
4	Cashmere, alpaca and other animal fibres	Wool
5	Copper ammonia	Viscose
6	Cotton/acetate	Polyester/cotton
7	Cotton/linen	Cotton
8	Cotton/linen/hemp	Cotton
9	Cotton/lyocell	Cotton
10	Cotton/modal	Cotton
11	Cotton/silk	Cotton
12	Cotton/viscose	Cotton
13	Elastomultiester	Polyester
14	Elastomultiester/polyester	Polyester
15	Hemp	Cotton
16	Jute	Cotton
17	Linen	Cotton
18	Lyocell/linen	Cotton
19	Lyocell/polyamide	Viscose
20	Lyocell/polyamide/wool	Wool/cotton
21	Lyocell/polyester (A100)	Polyester/viscose
22	Lyocell/polyester (A100)	Polyester/cotton
23	Lyocell/polyester/ramie	Polyester/cotton
24	Lyocell/wool (A100)	Wool/viscose
25	Modacrylic	Acrylic
26	Modal	Viscose
27	Polyamide/cotton	Polyester/cotton

[2] Fibre equivalence = fibres that can be treated as interchangeable (or grouped together) for dyeing purposes.

Table 7 continued		
Sr.No	Fibre/Fibre Blend	Equivalent for Dyeing
28	Polybutylene terephthalate (PBT)	Polyester
29	Polyester/cotton/linen	Polyester/cotton
30	Polyester/cotton/viscose	Polyester/cotton
31	Polyester/modal	Polyester/viscose
32	Polyester/PBT	Polyester
33	Polyester/viscose/PBT	Polyester/viscose
34	Polyester/viscose/wool	Wool/polyester
35	Ramie	Cotton
36	Rayon (viscose)/acetate	Polyester/viscose
37	Silk/wool	Silk
38	Triacetate	Polyester
39	Viscose/linen	Cotton
40	Viscose/lyocell	Lyocell
41	Viscose/modal	Viscose
42	Viscose/silk/cotton	Wool/cotton
43	Wool/acrylic	Wool/polyester
44	Wool/acrylic/viscose/polyamide	Wool/polyester
45	Wool/mohair/cotton/polyester	Wool/polyester
46	Wool/polyamide/acrylic	Wool/polyester
47	Wool/polyamide/cashmere	Wool
48	Wool/polyamide/cotton	Wool/cotton
49	Wool/polyamide/silk	Wool

Table 8: Fibre Equivalence[3] for Printing Processes

Sr.No	Fibre/Fibre Blend	Fibre Equivalence for Conventional Printing	Fibre Equivalence for Digital Printing
1	Acrylic	Polyester	n/a
2	Acrylic/polyamide	Polyester	Polyester
3	Acrylic/viscose	Viscose	n/a
4	Cotton/acetate	Cotton	Cotton
5	Cotton/linen	Cotton	Cotton
6	Cotton/lyocell	Cotton	Cotton
7	Cotton/modal	Cotton	Cotton
8	Cotton/silk	Cotton	Cotton
9	Hemp	Cotton	Cotton
10	Jute	Cotton	Cotton
11	Linen	Cotton	Cotton
12	Lyocell/linen	Cotton	Cotton
13	Modal	Viscose	Viscose
14	Polyamide/acetate	Polyester	Polyester
15	Polyamide/cotton	Polyester/cotton	Polyester/cotton
16	Polyamide/triacetate	Polyester	Polyester
17	Polyester/modal	Polyester/viscose	Polyester/viscose
18	Polyester/wool	Polyester	n/a
19	Ramie	Cotton	Cotton
20	Rayon(viscose)/acetate	Polyester/viscose	Polyester/viscose
21	Silk/wool	Silk	Silk
22	Triacetate	Polyester	Polyester
23	Viscose/modal	Viscose	Viscose
24	Wool/cotton	Cotton	Cotton
25	Wool/viscose	Viscose	Viscose

[3] Fibre equivalence = fibres that can be treated as interchangeable (or grouped together) for printing purposes.

Appendix B Key Process Variables Used in Water Use Benchmark Calculations

The process variables listed below are used to calculate water use benchmarks. In total, 10 parameters and variables are considered in the benchmark calculation.

1. Machinery type

For the ease of calculation, the following machinery is considered:

Table 9: Machinery Type Considerations

Substrate	Machinery Type Considered
Yarn	Regular yarn dyeing machines
Exhaust fabric process	Jet dyeing machines
Continuous fabric process	Continuous machines with a counterflow wash system
Garment	Rotative machines
Printing	Rotary printing machines
Digital printing	Digital single or multiple-pass machines

2. Fibre absorption/carry over

The following is applied when calculating water use benchmarks based on fibre composition:

- For cellulosic fibres, 200%
- For animal fibres, 200%
- For synthetic fibres, 100%
- For cellulosic/synthetic blends, 150%
- For animal/synthetic blends, 150%

3. Material-to-liquor ratio (MLR)

Determined based on factors such as machinery type, article weight and fibre composition/substrate.

4. Shades

Medium shades are included in the calculation of water use benchmarks. (In the specific case of wool, dark shades have been considered.)

5. Consideration for machine cleaning

The following considerations from the dyeing and printing processes are taken into account when calculating water use benchmarks.

- **Pre-treatment, dyeing, washing and finishing**

  Additional water consumed for machine cleaning is accounted for.

- **Conventional printing**
  Water consumed for cleaning machines and equipment, such as pumps, drums, printing blankets, and printing cylinders/screens, is included.

- **Digital printing**
  Water that is used for cleaning machinery equipment, like the printing blanket, is taken into account.

6. Inefficiencies

The inefficiencies below from the dyeing and printing processes are taken into account when calculating water use benchmarks.

- **Exhaust dyeing and continuous dyeing**
  Water that is consumed for colour adjustments and reprocessed, is taken into account.

- **Printing**
  Any additional water that is consumed due to the following aspects.
  - Metres printing with "design settings/fabric seconds".
  - Initial production metres are generated at the start of any lot
  - Additional washing steps are required due to poor fastness or colour migration during the white printing part

7. Water used for utilities

Water consumed in the boiler and water softening process is included in the calculation.

8. Water used for reprocessing material

Water consumed to reprocess any lot due to a faulty/incorrect material-to-liquor ratio calculation is included.

9. Washing off deviation

- **Dyeing**
  Water used to correct any washing off deviations is included in the calculation.
  Additional water used due to the standardisation of washing off: No differences in washing off conditions on different colour shades, fabric weights or small orders.

10. Washing mangles/cylinders

Water that is consumed for cleaning of mangles/cylinders (applicable when the mercerisation process is included in the facility operations).

- **Cleaning auxiliary tank**
  Water consumption for cleaning the auxiliary tank used during the yarn-dyeing process (applicable only to yarn wet processing).
- **Printing paste preparation**
  Water that is consumed for printing paste preparation (applicable when the conventional printing process is included in the facility operations).
- **Engraving cylinders**
  Water that is consumed for engraving cylinders for the printing process (applicable only when the engraving cylinders for printing are included in the facility operations).

Table 10: Summary of the Parameters & Variables Considered in the Calculation of Water Use Benchmarks

Parameters/variables	Exhaust pretreatment	Continuous pretreatment	Exhaust dyeing with pretreatment	Exhaust dyeing without pretreatment	Continuous dyeing with pretreatment	continuous dyeing without pretreatment	Conventional printing with pretreatment	Conventional printing without pretreatment	Digital printing with pretreatment	Digital printing without pretreatment	Washing	Garment laundry	Finishing
Theoretical process definition	x	x	x	x	x	x	x	x	x	x	x	x	x
Machine cleaning (except printing)	x	x	x	x	x	x					x	x	x
Machine cleaning- printing blanket							x	x	x	x			
Machine cleaning- printing equipment[1]							x	x					
Inefficiencies- colour adjustment			x	x									
Inefficiencies- Reprocesses			x	x	x	x							
Inefficiencies- For printing[2]							x	x	x	x			
Boiler and water softener consumption	x	x	x	x	x	x	x	x	x	x	x	x	x
Liquor ratio variation	x		x	x								x	
Washing off deviation		x			x	x	x[3]	x[3]	x[3]	x[3]			
Washing mangle/cylinder		x[4]			x[4]		x[4]		x[4]				
Cleaning auxiliary tank			x[5]										
Printing paste preparation							x	x					
Engraving Cylinder							x	x					

1. Refers to additional water for cleaning pumps, drums and printing cylinders/screens.
2. Refers to additional water for "metres printing with design settings/fabric seconds", initial production metres and addition washing steps due to poor fastness or colour migration to the white printing part
3. Only applicable when printing with soluble dyestuffs.
4. Only applicable for continuous pre-treatment processes that include the mercerising step
5. Only applicable for processes of yarn dyeing

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The fundamental principle of collaboration at ZDHC was followed in developing the Water Use Benchmarks for Textiles. A Focus Group was formed from Signatory Brands, Suppliers and Solution Providers, and a representative of the ZDHC Wastewater Council, facilitated by the ZDHC Water Competence Centre, which developed the benchmarks through calls and emails from March 2025 to July 2026.

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(ZDHC is also working on Water Use Benchmarks with a Leather Focus Group, in collaboration with Leather Working Group (LWG), to co-create water use benchmarks for leather wet processes.)

List of tables

List of terms (Abbreviations)

ETP	Effluent Treatment Plant
MLR	Material-to-Liquor Ratio
GLM	Grams per linear metre
GSM	Grams per square metre