



# WASTEWATER TREATMENT & ZERO LIQUID DISCHARGE SOLUTIONS FOR THE TEXTILES INDUSTRY



**WATERLEAU**  
protecting the 4 elements

# TEXTILES : LARGE WATER FOOTPRINT AND CHEMICAL USAGE

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The textile industry is an intensive water user and producer of wastewater. Sustainable production implies using less water by maximum wastewater and chemicals recovery. The wastewater produced during the production of yarns and fabrics contains a very diverse range of chemicals and dyes. Treatment of large amounts of highly polluted wastewater requires a combination of biological and physico-chemical treatment steps , applying a customized approach.



### Constituents

Yarn waste, unused starch-based sizes

Enzymes, starch, waxes, ammonia

Disinfectants and insecticides residues, NaOH, surfactants, soaps

$H_2O_2$ , AOX, NaOCl, organics

NaOH

Colour, metals, sulphide, salts, acidity, alkalinity, formaldehyde

Urea, solvents, colour, metals

Chlorinated compounds, resins, spent solvents, softeners, waxes, acetate

### Wastewater characteristics

Yarn waste, unused starch-based sizes

Enzymes, starch, waxes, ammonia

Oily fats, BOD (30% of total), high pH, temp (70-80°C), dark colour

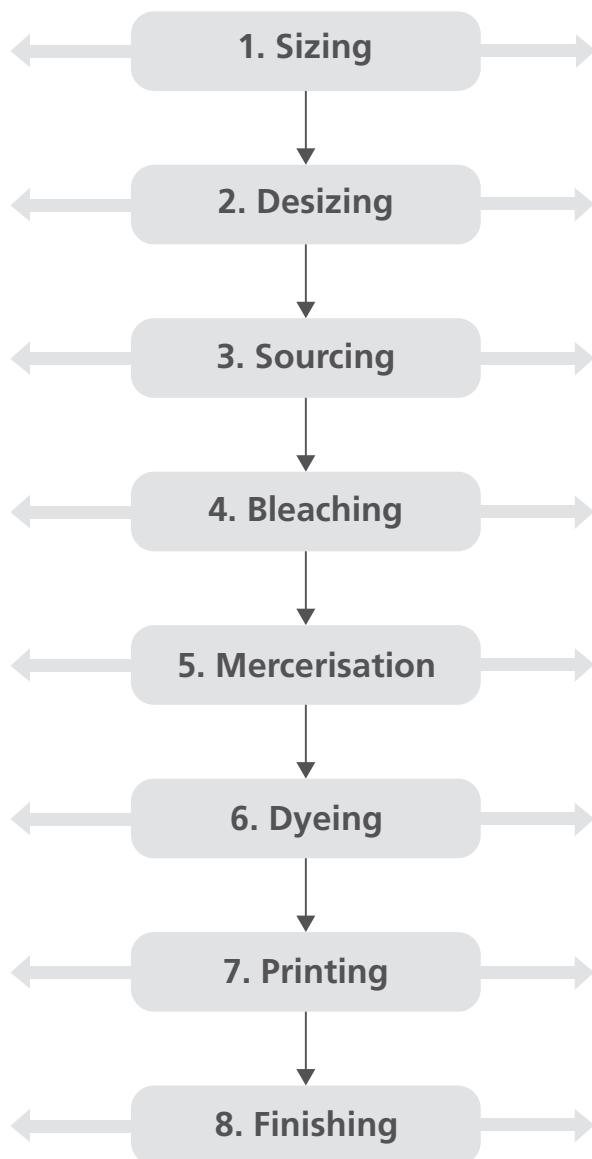
High pH, TDS

High BOD, high pH, suspended solids

High toxicity, BOD (6% of total), high dissolved solids, high pH

High toxicity, high COD, high BOD, high dissolved solids, high pH, strong colour

Low alkalinity, low BOD, high toxicity



# A GLOBAL INDUSTRY

The diversity and origin of the raw materials and chemicals, the long, fragmented and scattered production process of yarn production into fabrics, clothing, garments and other textile products, is characteristic for the industry. Industry regulations in each country are different, but the global textile brands are trying to standardize these globally.

## ZDHC: THE NEW TEXTILE INDUSTRY STANDARD FOR WASTEWATER TREATMENT

The Zero Discharge of Hazardous Chemicals Programme (ZDHC), a recently created global self-regulatory organization, has set standardized industry wastewater discharge limits. These effluent limits go beyond regulatory compliance, to ensure wastewater discharge does not adversely affect the environment and surrounding communities.

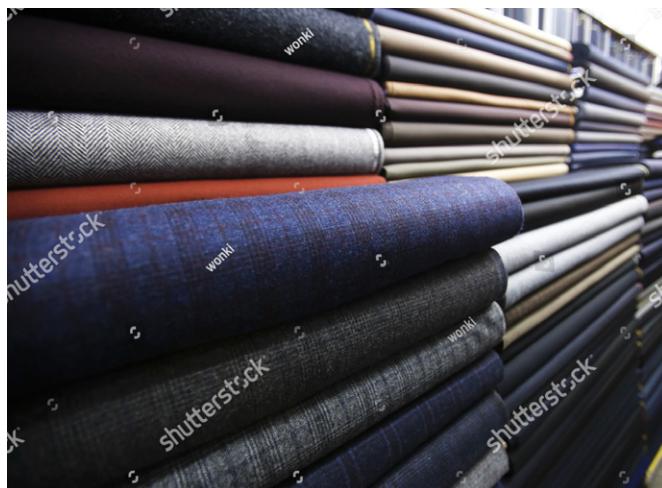
The ZDHC Wastewater Guidelines set a unified expectation on wastewater quality for the entire textile and footwear industry. The expected outcomes of using these guidelines are to:

- Ensure wastewater discharge does not have an adverse impact on communities and the environment.
- Create a unified monitoring and testing program to aid suppliers to systematically and efficiently share discharge data with consumers, brands, and other interested parties.
- Reduce supplier operating costs and increase operational efficiencies by defining a standard cadence for wastewater and sludge testing and reporting requirements, which applies to all consumer, brands that adopt this guideline.
- Define pass/fail reporting limits for the analytical testing of hazardous chemicals in wastewater discharges and sludges produced during wastewater treatment operations.

ZDHC proposes foundational, progressive and aspirational limit values for conventional parameters as part of this wastewater guidance document.

Committed to a sustainable use of natural resources, more and more global brands and textile manufacturers are adhering to the ZDHC programme (see [www.roadmaptozero.com](http://www.roadmaptozero.com) for the ZDHC guidelines and limit values)





## SOLUTIONS FOR MEETING THE MOST STRINGENT REGULATIONS

Waterleau's portfolio of integrated water solutions includes biological as well as physico-chemical and advanced oxidation (AOP) technologies to treat all types of water and wastewater. We help more than 2000 clients in all industries to comply with the most stringent regulations while limiting the water footprint at minimal Capex and Opex. In the textile industry, our water treatment and water recovery expertise is being implemented in every step of the industry's value chain: from spinning and weaving to printing and finishing. At Waterleau, we are committed to help textile and footwear factories comply to the ZDHC programme's foundational, progressive as well as aspirational guidelines.

## WATERLEAU TEST LAB : TRY BEFORE YOU BUY

The diversity of textile wastewaters requires tailor made process designs. In the past too many wastewater treatment plants have failed to achieve the effluent standards, especially in relation to COD, color and nutrients (N&P). Our lab scale testing pilots at our the Waterleau HQ, are designed to test your unique process in an accurate but small-scale simulation. Our pilot hall contains a complete range of reactors allowing anaerobic and aerobic process optimization before full-scale implementation. Physico-chemical, advanced oxidation (AOP) and membrane techniques are being tested as well, as pre- or as post treatment, since very stringent effluent discharge and effluent reuse requirements are currently the industry standard. Wastewater samples are being shipped from clients' plants from all over the world:

**"Better insights will lead to smarter decisions"**



### STATE OF THE ART INFRASTRUCTURE AVAILABLE

- Wastewater sample analysis
- Process optimization testing
- Toxicity and biodegradation testing
- Product and technology development projects

# CASE STUDY VLISCO, GHANA

For over 170 years, Vlisco has created more than 350,000 original textile designs. Many of these designs have become cultural treasures, bestowed with special names and meanings by the merchants of Central and West Africa. New designs are produced each year alongside traditional classics to hearten the new generation of Vlisco enthusiasts. Vlisco's highly expressive and creative customers transform the fabrics into fashionable looks, which are one of a kind. Inspired by Africa, designed in the Netherlands, Vlisco's heritage and design signature is a multicultural melting pot of beauty and industrial craftsmanship. The designs are always mirrored on the front and back of the cotton cloth fabric. With the use of the special wax printing technique, the pattern is applied to the fabric.

## TREATMENT AND REUSE

The factory generates 1,100 m<sup>3</sup> of wastewater per day, originating from their spinning, weaving of cotton and cotton yarns and their textile printing process.

After a proper screening, the wastewater is being treated in a Biotim Aerobic system, an activated sludge system, the main process of the wastewater treatment plant. Organic compounds and nutrients are degraded biologically.

After the biological treatment the biological effluent is upgraded by a Boomerang effluent reuse system, using UF and RO technologies. The Boomerang produces colorless water with a very low salt concentration, ideal for reuse in the production.



# CASE STUDY: MISR HELWAN, EGYPT

## SUSTAINABLE SOLUTIONS FOR THE TEXTILE INDUSTRY

The Misr Spinning and Weaving Company (MISR) was founded in 1927 by a group of Egyptian businessmen in collaboration with the Misr Bank. Solar heat is increasingly being used in dye and bleaching saving the textile company ten thousands of barrels of oil annually.

Production of textile is amongst the primary sources of foreign income and the 2nd largest manufacturing sector in Egypt. Over 3.000 companies - dominated by public enterprises – are active in the production of cotton yarns and the spinning and weaving of fabric. Processing the cotton requires large quantities of water but the textile industry is currently moving towards uniform and environmental friendly production standards. The Misr Spinning & Weaving Company located in El Mehalla El Koubra is the single largest in its kind and is producing 50.000 m<sup>3</sup> of wastewater on a daily basis. Misr Concrete Development Company and WATERLEAU have been contracted to engineer, procure and construct a new wastewater treatment plant. The wastewater will undergo a primary treatment stage consisting of screening, oil and grease skimming, coagulation and flocculation followed by primary sedimentation.

### LUCAS®: COMPACT SYSTEM HANDLING LARGE FLOWS.

The core of the new wastewater treatment plant is the biological treatment stage, which is designed with WATERLEAU's proprietary LUCAS® technology. Both organic compounds and nutrients are degraded in a sustainable way, whereas specific pollutants will be absorbed on activated carbon. The biologically produced sludge is stabilized and thickened or dewatered before disposal. The treated wastewater finally will receive chlorination for disinfection and oxidation for color removal, followed by sand/anthracite filter polishing. The plant was successfully commissioned since April 2015.



# CASE STUDY: COATS TEXTILE, VIETNAM

## DYEING WASTEWATER

With a rich heritage dating back to the 1750s, Coats is the world's leading industrial thread manufacturer. Headquartered in the UK Coats employs 19,000 employees in over 50 countries across six continents around the world. Coats Vietnam is based in the world's largest textile cluster: South & South-East Asia. As a renowned textile brand and as a member of the ZDHC Program, Coats engaged itself to meet the most stringent parameters on wastewater treatment. With the Coats Vietnam Plant being located in an urban area (the middle of HCMC) no risks could be taken with respect to the treated water quality.

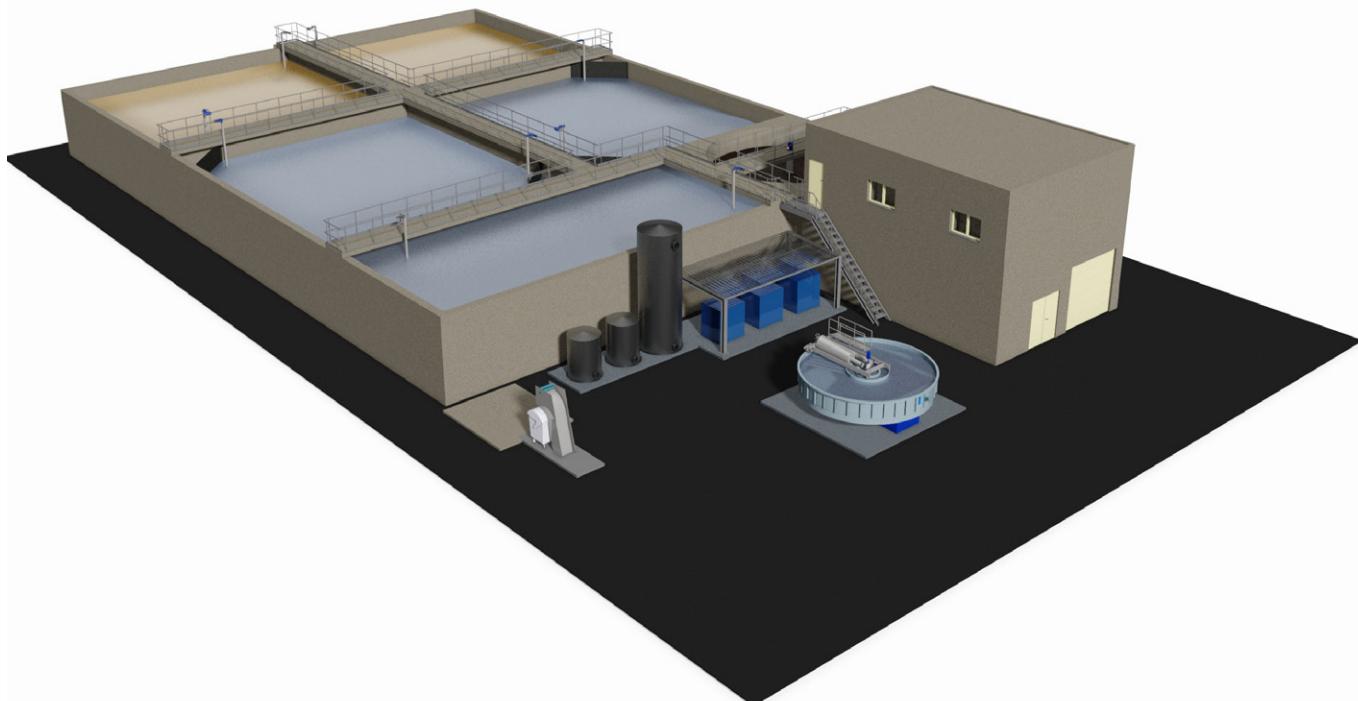
The wastewater treatment plant at Coats Vietnam will treat the wastewater originating from it's polyester dyeing (disperse dyes - 70%) and nylon dyeing (acid dyes - 30%). Additional wastewater originates from the cotton towel dyeing using vat/reactive dyes. For disperse dyeing, the two main chemicals used are a buffer and a levelling agent.

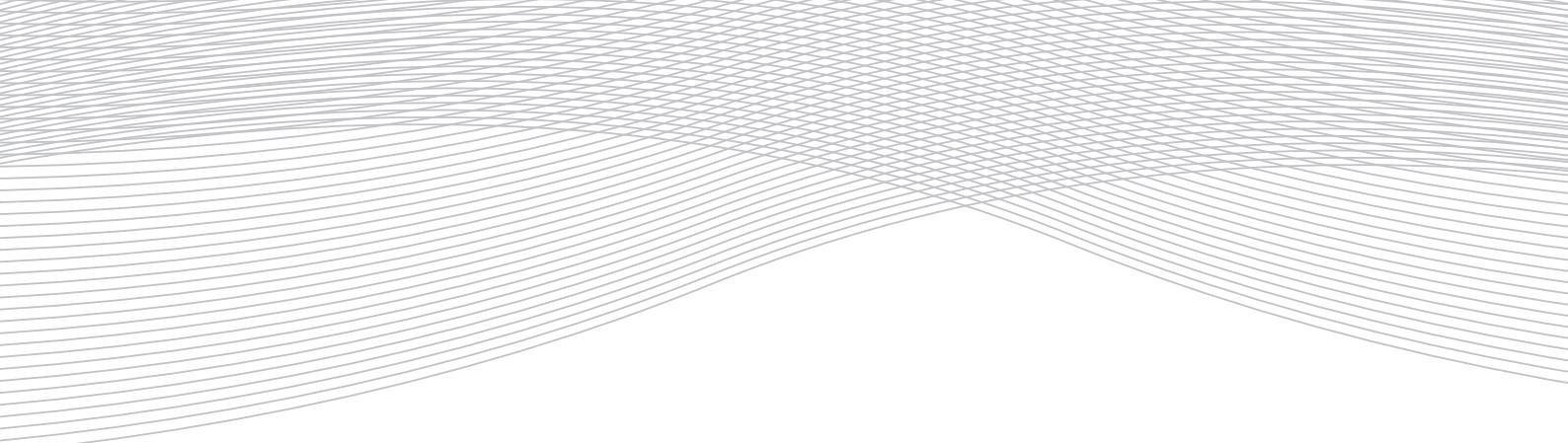
For acid dyeing, four main chemicals are being used: an acid donor, a levelling agent, a scouring agent and soda ash. For cotton dyeing, the chemicals used are a sequestering agent, a levelling agent, a wetting agent and an alkaline agent for reactive dyes or hydrogen peroxide for VAT dyes.

The wastewater that is generated features a high COD (with important recalcitrant COD-level) and is highly alkaline in nature.

## LUCAS® & KROFTA® DAF TO MEET STRINGENT ZDHC GUIDELINES

Waterleau was awarded the construction of the complete wastewater treatment plant . WATERLEAU's patented LUCAS®-4 continuous SBR process, is typically applied to treat difficult waters such as those encountered within the textile industry, and known to contain recalcitrant COD and color was selected. In order to guarantee a complete color removal, the possibility to inject Powdered Activated Carbon (PACT® process) was added. A final polishing step for COD and color removal consists of a Physical chemical treatment with WATERLEAU proprietary KROFTA® SUPRACELL dissolved air flotation technology.





# STATE-OF-THE-ART TECHNOLOGIES FOR THE REDUCTION OF THE WATER, ENERGY AND CARBON FOOTPRINT

## +5.000 REFERENCES IN THE INDUSTRY

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DESIGN  
ENGINEERING  
CONSTRUCTION  
OPERATION  
MAINTENANCE  
RENTAL

### PROTECTING THE 4 ELEMENTS



We all have the responsibility to handle our natural resources in a careful and sustainable way. Waterleau develops environmental technologies and offers sustainable solutions for water, air and waste treatment, as well as for energy recovery. As an EPC contractor and operator, Waterleau counts more than 5.000 references for municipal and industrial clients around the world.