

Cleaner Production Training for EPD Punjab

Promoting Sustainability in the Textile and
Garment Industry in Asia (GIZ-FABRIC)



FABRIC Asia

7. Performance Evaluation and Inspection of Textile Units

11:15 – 12:00

Helmut Krist

Independent Consultant

on behalf of GIZ FABRICS and Espire Consult

Agenda

- Checklist Boiler operation
- Checklist for inspecting Effluent Treatment Plant, ETP

Typical Quick Questions for Inspection

- Does the facility have an up-to-date chemical inventory?
- Does the facility record quantities of chemical products used for each work order/production order?
- Does the facility regularly identify the quantity of chemicals lost due to accidents (e.g., spillages, poor labelling, accidental mixtures)?
- Does the facility have a document retention procedure that requires retention of key chemical inventory records for at least one year?
- Does your facility have a documented inventory of chemicals purchased (including your supplier's manufacturing locations), stored (including their location) and used at your facility?

Field Inspection Checklist

This inspection checklist is a tool to review information provided by the company before the company is visited. During the visit the data can be compared with original records and answered from interviewed people.

General

- **Name of Company:**
- **Industry type: textile processing**
- **Main production processes:**
- **Final products:**
- **Name of major raw materials used:**
- **Production (ton per months):**
- **Water consumption (m3 per month):**
- **Electricity consumption (KWh per month):**
- **Fuel (diesel) consumption per month:**
- **Other fuel consumption per month (coal, gas, etc.):**
- **Wastewater discharged (m3 per month):**
- **Environmental Clearance Certificate (ECC) available?**
- **Environmental Management Plan available?**
- **What do you monitor in accordance to your EMP?**

Effluent Treatment Plant (ETP)

STP treatment Step	Yes / No	Volume (m3)	HRT (hours)	HRT Benchmark (hours)
Pre-settling				4
Oil and Grease Trap				0.5
Screens (coarse and fine)				
Equalization				8-10
Flash mixer (static or small tank with high rpm)				5 min
pH adjustment (could be integrated with flash mixer)				
Flocculation tank (with low rpm mixer)				5 min
Clarifier / tube settler / plate settler				
Dosing of N and P as required				
Aeration Tank				24
Clarifier (with sludge return / flow meter)				
Sand filter				
Carbon filter				
Sludge thickener				
Filter Press				
Drying bed				
Flow Meter				

ETP Effluent Standards

Parameter	Value (mg/l) except pH	Threshold (mg/l) except pH
pH		6.5 - 9
Suspended Solids		100
BOD		150 *
Oil and Grease		10
Total Dissolved solids		2100
Wastewater flow		100.per kg of fabric processed

Special parameters based on classification of dyes used

Parameter	Value (mg/l) except pH	Threshold (mg/l) except pH
Total Chromium as Cr		2
Sulfide		2
Phenolic compounds as Phenol		5

ETP control

Action	Measured / Done	Record available
Screen cleaning		
pH at coagulation step		
Visual check at flocculation step		
Regular cleaning of plate settler		
Analysis of N and P before biological treatment		
Controlled dosing of N and P		
O2 in aeration tank		
Visual check of flocs in aeration tank		
Sludge volume (SV)		
Mixed liquor Suspended Solids (MLSS)		
Sludge Volume Index (SVI)		
pH		
Flow of sludge return		
MLSS in settling tank		
Visual: floating sludge in settling tank / cleaning of surface		
Flow meter		

Sludge

- Amount of sludge from flocculation process: ton per months, water content
- Amount of sludge from biological treatment: ton per months, water content
- Total amount of sludge and water content:
- Records available for sludge surrender? How much sludge has been surrendered in one year?
- Content:
- Where do you discharge your sludge?
- Do you have proof on sludge discharge?

Emission to Air

- **Boiler**
- **Particle emission from production processes**
- **Genset**

Resource Efficiency and Cleaner Production

- **Did you implement any programs on energy efficiency, water consumption efficiency, waste reduction, or raw material reduction?**
- **Energy efficiency program / activities:**
- **Water consumption efficiency programs / activities:**
- **Waste reduction program / activities:**
- **Raw material efficiency program / activities:**

Water Consumption

Water Consumption	m3/month
Production Process	
Boiler	
Softener	
Cooling	
Domestic (shower, toilets, kitchen, etc.)	

Electricity Consumption

Electricity Consumption	KWh/ month
Production Process	
Water heating	
Cooling	
Office	
Other main consumer (please state)	

General Measures for RE and CP

- **What AC and with what refrigerant?**
- **Do you use energy efficient boiler?**
- **Do you have heat or cold wasted into the environment? (e.g. hot air from AC or exhaust from boiler or genset)**
- **Do you use heat exchanger?**
- **Do you use heat pumps?**
- **Do you use variable speed drives? (e.g. for pumps)**
- **Do you use biodegradable surfactants and tensides and complexing agent?**
- **Do you use chlorinated and fluorochlorinated solvents in open systems?**
- **Good Housekeeping measures implemented?**
- **Amount of raw material, water, energy (electricity, diesel, coal) measured, recorded, and evaluated?**

Specific Measures for RE and CP, Desizing

Measure	
Selection of more bioeliminable sizing agents (e.g. modified starches, polyvinylalcohol, polyacrylates)	
Integration of desizing / scouring and bleaching in a single step, reuse of bleach rinse water in desizing)	
Recovery and reuse of specific water-soluble synthetic sizing agents by ultrafiltration	

Specific Measures for RE and CP

Bleaching

Measure	
Use of H ₂ O ₂ as bleaching agent	
Reduce Na hypochlorite	

Mercerizing

Measure	
Use of H ₂ O ₂ as bleaching agent	
Reduce Na hypochlorite	

Specific Measures for RE and CP

Dyeing

Measure	
Automatic dosing and dispensing of dyes	
Use of systems with reduced liquor to fabric ratios	
Automatic control of temperature and dyeing cycle parameters	
Reuse of rinse water for subsequent dyeing or use countercurrent rinsing	
Adaption of low salt techniques for reactive dyeing	
Use pH controlled processes	

Specific Measures for RE and CP

Printing

Measure	
Reduce printing paste losses in rotary screen by minimizing the volume of printing paste supply and by recovering and recycling printing paste	
Reuse rinsing water leftover from cleaning the printing belt	
Use printing paste with low or no VOC emissions (e.g. water-based)	

Checklists for performance assessment of energy utilities

ENERGY EFFICIENCY SELF-ASSESSMENT CHECKLISTS



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INTRODUCTION: This workbook consists of multiple checklists that conduct Assessment of Energy Management in Steam, Compressed Air, Motors, Pumps, Lighting and Power Generation Systems.

WHAT WE DO HERE: Conduct Self-assessment of systems and facilities by rating the performance against each energy saving option in "RATING" column.

A dark grey rectangular area containing seven orange boxes, each representing a checklist item. The items are arranged in three rows: the first row has three items, the second row has three items, and the third row has one item centered.

- 1 | Checklist for Hot Water & Steam System
- 2 | Checklist for Compressed Air
- 3 | Checklist for Lighting System
- 4 | Checklist for Motor System
- 5 | Checklist for Power Generation & Distribution
- 6 | Checklist for Pump & Pumping System
- 7 | Checklist for Thermal Oil Heater

Checklists for performance assessment of energy utilities

CHECKLIST FOR HOT WATER & BOILER SYSTEM



ENERGY PERFORMANCE MEASURES

LEVEL	PRODUCTION	RATING
-	Optimize boiler excess air, excess oxygen, and CO levels according to fuel type through boiler tuning based on Flue Gas Analysis [1% excess air reduction will increase 0.6% efficiency of combustion].	3
-	Insulate the Boiler surface completely and regularly monitor the surface temperatures to keep it close to Ambient Temperature.	1
-	Test Water Quality (feed water and Blow-down waste water) regularly to assess and maintain the efficiency of water treatment systems [Feed water and Blow-down TDS should be lesser than 100 ppm and 3500 ppm respectively].	5
-	Devise Blow-down cycle amounts and times based on water quality test to avoid the Blow-down loss.	1
-	Analyse the gap between the Generated and Demanded steam pressure and try to minimize it.	2
- -	Install automatic boiler Blow-down system.	4
- -	Separate fresh water from condensate water to avoid heat loss. Preheat fresh water before mixing with condensate water.	»

LEVEL OF DIFFICULTY:

- No/Low Cost or Short Term Investment [Pay-back period < 6 months]
- - Medium Term Investment [Pay-back period < 18 months]
- - - Long Term Investment or Needs Feasibility Study [Pay-back period > 18 months]

RATING OF IMPLEMENTATION STATUS:

- 1 Energy Saving Option has not been considered yet.
- 2 Energy Saving Option is in the planning stage but not yet realized.
- 3 Energy Saving Option is partially (not in all areas/ machines or not all the time) implemented/ realized.
- 4 Energy Saving Option has been mostly implemented/ realized.
- 5 Energy Saving Option is fully realized.



**Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH**

Registered offices
Bonn and Eschborn