

# TRAINING PROGRAMME FOR ETP OPERATORS IN TEXTILE INDUSTRY

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

# General ETP Operation - Part 1

GIZ FABRIC – ETP Operator Course



# Contents

- Good basic operator practices
- Organizing daily operational tasks

# Good basic operator practices

# Good basic operator practices

- Even if operators actions appear simple enough need for paying attention to details!
- Operator mostly being on 'rounds' and not sitting in room
- Second 'round' is actual ETP operation

# Good basic operator practices

- **Reach** ETP minimum 15 minutes **before start of shift**
  - For communication with previous shift being in charge
  - For entering attendance/bio-metrics
- **Change into work uniform** and neatly fold away regular clothes
  - Collect and don all necessary personal protective equipment

# Good basic operator practices

- Spend some minutes with relieving operator for **handing over**
  - Inform yourself about any specific incidents of previous shift.
  - Ask for specific points which need to be taken care of
- **Check** if **all records filled** completely by relieving operator
  - If any missing, ask relieving operator for reason and explanations

# Organizing daily operational tasks



# Organizing daily operational tasks

**Organize daily tasks** based on

- **handing over** from relieving operators
- **weekly workplan** and tasks as agreed with supervisor (factory manager, ETP manager)
- initiate “doing the rounds”
  - First round
  - Second round



# Organizing daily operational tasks

## First ETP round

- Get overview of general conditions in plant
  - **Note down** any observation in pocket book
  - **Do not try to remember them!**



# Organizing daily operational tasks

## First ETP round

### Specific checks

- Raw effluent flowing in?
- Screen(s) working?
- Adequate water level in equalization tank?
- Right chemical dosing tank levels?
- Adequately prepared chemicals?



# Organizing daily operational tasks

## First ETP round

### Specific checks (contd.)

- Tank for chemical preparation full of water and all chemicals necessary added?
- Agitator running?
- Visit MCC room
  - observe if any motors tripped?
  - any warning indications on?



# Organizing daily operational tasks

## First ETP round

### Control questions and check points



<b>Visual signs</b>	Any evidence of overflows, excess inflows, foaming in tanks, etc.?
<b>Sounds</b>	Any change in characteristic sound indicating mechanical error?
<b>Smell</b>	An abnormal, unpleasant smell indicating problems?
<b>Heat/vibrations</b>	Any motor bearings too hot to touch? Any unusual vibration at pumps, agitator etc. noticed?
<b>Color</b>	Any perceptible color change in aeration tank from usual ones?

# Organizing daily operational tasks

## First ETP round

### Plan follow-up actions

- 1) **Review notes** taken during first ETP round
- 2) **Study records** from **previous shift** for any abnormal occurrence calling for action
- 3) Refer to **preventive maintenance chart** for any action needed?
- 4) Arrange laborers if
  - chemicals to be loaded into preparation tank
  - cleaning around ETP needed



# Organizing daily operational tasks

## First ETP round

### (5) Make **maintenance arrangements**

- **Check status of any equipment** sent for servicing or repair
  - Responsibility of operator to get it back!
- Send **faulty equipment for repair immediately** since standby no guarantee for optimal ETP operation!

### (6) Plan tasks for second ETP round

- Decide and list any activities that need to be done first



# Organizing daily operational tasks

## Second ETP round

Covering actual daily operations and tasks

### (1) Cleaning of **manually operated screen**

- No clogging, leakage of solids and increase of usual water levels

### (2) Ensure functioning of **tank for chemical preparation**

- Ensure equalization tank **level within operating level**
  - If level too low, do not start pump
- Ensure **adequate chemical slurry**
  - Enough to feed effluent during shift



# ETP operation rounds

## Second ETP round

### (2) Chemical preparation tank (Contd.)

- **Run agitator** and be ready to take over, once tank in line of dosing empty
- If **only one feeding tank**
  - Plan pumping to stop in time for emptying chemical slurry
  - Never add water to chemical dosing tank to continue operation
  - **Keep chemical** and support **ready for charging** before tank empty

# ETP operation rounds

## Second ETP round

### (2) Chemical preparation tank (Contd.)

- Start feeding of chemical & water immediately after dosing stopped
- Make sure that pumping and chemical dosing resumed before equalization tank level reaching desired high level

# ETP operation rounds

## Second ETP round

### (3) Check **functioning of flash mixer**

- If empty start agitator once tank half full
- Start running before feeding chemicals to flash mixer

### (4) Verify **right chemical dosage**

- Check dosing pump control ensuring value of chemical flow
- Make adjustments in dosing if slurry concentration changed!

# ETP operation rounds

## Second ETP round

### (4) Ensure **right chemical dosage (Contd.)**

- **Prepare polyelectrolytes (PE)** first as **stock solution**, then **dilute to required value** in dosing tank
  - Do not add stock solution or water to dosing tank while in operation till dosing cycle over (!)
- Make sure that PE dosed only in flocculator tank

# ETP operation rounds

## Second ETP round

### (5) Ensure **proper functioning of primary clarifier**

- Check **chemical slurry and effluent entering** primary clarifier feed-well drum.
- Ensure **feed-well drum properly** levelled and no overflow
- Make sure clarifier scrapper (and skimmer device, if there) running all time

# ETP operation rounds

## Second ETP round

### (6) Ensure **smooth operation of primary clarifier**

- Take sample of slurry and effluent in measuring cylinder
- Observe whether settling smooth, gradual and well compacted
- Check and record due date of last sludge removal
- Check whether intervals between sludge removals not too long
- Clean clarifier overflow launder with a spindle-brush
- Remove any sediments from channel

# ETP operation rounds

## Second ETP round

### (6) Ensure **smooth operation of primary clarifier**

- Check V-notches or weir plates to see overflow uniform
  - If not, make note for making readjustment of V-notches during next shutdown
- Check whether skimmer (wherever available) effectively removing scum



# ETP operation rounds

## Second ETP round

### (7) Ensure **functioning of tube settlers**

- **Check pumping rate** not exceeding loading rate
  - Depending on media shape, angle of installation and total overflow weir length
- Check for **solid overflows** in clarified effluent.
  - Any unusually high solids due to overloading and/or inadequate withdrawal of sludge?
- Adjust **pumping rate** if flow rate differs from designed values
- **De-sludge tube settlers** more frequently than clarifiers
  - No sludge storage/thickening compartment available



# ETP operation rounds

## Second ETP round

### (8) Check **cooling tower operation**

- Check temperature not to exceed 40 degrees
  - if too high, reduce pumping flow or service to cooling tower
- Check whether falling of water smooth and uniform



# ETP operation rounds

## Second ETP round

### (9) Check and record **pH-value**)

- Verify **pH value in neutralisation** area between 7.0 - 7.5
  - In case of automatic acid dosing systems based on pH values, keep settings accordingly
- Check **pH and temperature at aeration tank inlet** of to make sure that values in normal range



# ETP operation rounds

## Second ETP round

### (10) Check **aeration tank condition**

- **Surface** of fine bubble diffused aeration system **uniform with gentle agitation?**
- **Any areas with coarse bubble** indicating broken diffusers?
- **Note observations and arrange for replacement** of diffuser at earliest
  - Reserve one day in a week for such works



Fine bubble aeration with only gentle agitation at top



Coarse bubbles and strong agitation of surface

# ETP operation rounds

## Second ETP round

### (10) Check **aeration tank condition**

- See typical coarse bubbles as indicators for broken diffuser in video (in right hand side)



# ETP operation rounds

## Second ETP round

### (10) Check **aeration tank condition**

- If coarse bubble observed in ETPs with separate air lateral pipes with valves, close these
- Look for any dead spots (areas with no aeration) indicating clogged diffuser (see photo right hand side)
- Note observations and arrange to clean or replace diffusers as per early as possible



Aeration tank with dead spots: Indication of blocked diffusers

# ETP operation rounds

## Second ETP round

### (11) Aeration tank sampling

- Take **sample bio-sludge** from aeration
  - Sample with clean measuring cylinder of 1 litre without blurred walls (see photo)
- **Observe settling pattern** (e.g. too fast or slow)



Observing the settling in aeration tank - one of the most important checking by operator

# ETP operation rounds

## Second ETP round

### (11) Aeration tank sampling

#### Settling patterns to check

- Thin layer of **supernatant visible after 2-3 min?**
  - for ETP with no primary treatment to slightly colored but clear.
- Sludge **settling as block** (about half of the volume)?
- **Supernatant turbid?**
  - Activated sludge not settling as block and no bio-fluctuation



Observing the settling in aeration tank - one of the most important checking by operator

# ETP operation rounds

## Second ETP round

### (12) Check and observe **foam formation**

- Check for presence of **excessive foam**
- Take **control measures**
  - Spray water to arrest foam if facilities provided for
  - Dose anti-foam compounds to arrest foam
  - Use only silicone based anti-foam agent to not affect micro-organisms
- **Clean marks** left by dark foam at walls **once a week** by using broom and soap solution



# ETP operation rounds

## Second ETP round

- (12) Check and observe foam formation
- Wash away foam entries from walkways with water spray
  - Apart from untidy appearance posing safety risk (slippery)!



Slippery platform without handrail

# ETP operation rounds

## ETP Second round

- (13) Check **nutrient addition** to aeration tank
  - **Track frequency**
  - If due, **prepare and add nutrients**
  - Check whether **bio-sludge settling** kept in measuring cylinder from previous shift
  - If so, pour out and fill cylinder with fresh one
    - Let settle and come back for recording value!
  - **Calculate SVI** from last MLSS value obtained and verify whether within desired value

# ETP operation rounds

## Second ETP round

### (14) Check **DO readings**

- Check DO near inlet and outlet of aeration tank and **record DO values**
  - Minimum DO needed in aeration tank is 2.0 mg/l
  - If above 3.0 mg/l waste of energy
- **Increase or decrease airflow** according to DO reading



# ETP operation rounds

## Second ETP round

### (14) Check **DO readings**

#### ■ **Adjusting air flow**

- **Switch blowers on or off** to adjust DO after evaluating situation
- **Adjust speed**, if blowers equipped **with VFD**
- If equipped with **automatic DO based speed**, **check settings** if limits not maintained



# ETP operation rounds

## Second ETP round

### (15) Check **blower system**

- Observe whether general **noise levels normal**
- Touch and check if any blowers getting **overheated or vibrating**
- **Rotate blower operation** to ensure sufficient offline time for each blower

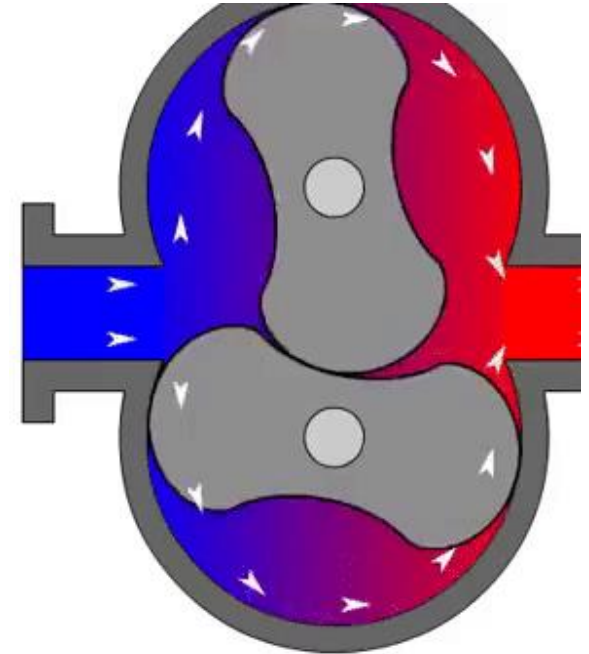


# ETP operation rounds

## Second ETP round

### (15) Check **blower system**

- Check whether air pipes and air filters clean
  - Arrange for cleaning of necessary
- Check and tighten bellows, if necessary
- Check whether oil levels adequate
  - Arrange for topping up, if necessary



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