Containerized Package Sewage Treatment Plant (Biotrane MBR 250) based on MBR Technology 250 m³/day for Strabag Oman LLC, Duqm, Oman
**Project Name**

The Containerized Package Sewage Treatment Plant (STP) of 250 m³/day based on MBR Technology is located at the Project Site of Strabag and caters to the wastewater treatment requirements of the Workers Camp.

**Client**

Strabag Oman LLC, Duqm, Oman

**Design, Engineering, Fabrication & Commissioning**

EarthCAD Environment FZ-LLC, RAK, UAE

**Membrane Filtration Units**

Microdyn-Nadir, Germany

**Scope of Services**

Scope of Work under this project includes:

- Design, Engineering, Fabrication & Commissioning of Package Sewage Treatment Plant of 250 m³/day capacity based on MBBR Technology including all Electrical & Mechanical Works.
- Operation and Maintenance of STP including Supply of Consumables and Chemicals for 1 year.

**MBR Treatment Technology**

The MBR process is a high rate suspended growth activated sludge process system that utilizes microporous membranes for solid/liquid separation in lieu of secondary clarifiers. The typical arrangement of MBR System includes a tank with Anoxic zone, Aeration zone and internal mixed liquor recycle pumps. The Membranes are submerged in the Mixed Liquor inside the Membrane Filtration Tank of the Bioreactor. **Flatsheet Type Ultrafiltration Membrane Units with Mechanical Cleaning Process (MCP)** from Microdyn-Nadir, Germany have been used in the STP. The MBR plant delivers very high quality permeate which is pumped out by permeate pump for effluent reuse.

**Design Basis**

The Package MBR STP has been designed taking into consideration the wastewater flow (250 m³/day) and characteristics as given below.

**Inlet Wastewater Characteristics**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Designed (Maximum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD</td>
<td>250 mg/L</td>
</tr>
<tr>
<td>COD (Total)</td>
<td>600 mg/L</td>
</tr>
<tr>
<td>TSS</td>
<td>250 mg/L</td>
</tr>
<tr>
<td>pH</td>
<td>6.5-8</td>
</tr>
<tr>
<td>Ammonical Nitrogen</td>
<td>40 mg/L</td>
</tr>
</tbody>
</table>

**Design and Process Flow Scheme**

The Design and Process Flow Scheme of the 250 m³ per day MBR STP is as follows:

- Manual Coarse Bar Screen before Equalization Tank
- Equalization Tank for Homogenization of flow
- Air Blowers for Sewage Collection Tank & Sludge Tank with all accessories including air distribution system
- Submersible Sewage Feed Pumps
- Mechanical Fine Screen, 1-2 mm
- Separate Anoxic and Aeration Compartments. The tanks are made of 6 mm thick Mild Steel plates and externally and internally Epoxy painted.
- Fine Bubble Diffusers and Air Grid in Aeration Tank
- Air Blowers for Aeration Tanks with all accessories including air distribution system in GI
- MBR Tank with Membrane Filtration Modules (2 x BC400) and related accessories
- Air Blowers for MBR Tank with all accessories including air distribution system
- Permeate Pumps and Accessories
- Chlorine Dosing System for disinfection
- Sludge Recirculation Pumps
- Waste Sludge Storage Tank
- Treated Sewage Effluent (TSE) Storage Tanks
- Electrical control panel with PLC automation, SCADA System and VFD for Permeate Pumps for operation and control of equipments
- Civil Works for RCC Platforms for Placement of Equipments and Tanks
**STP Performance and Treatment Efficiencies**

The Plant was commissioned on **16th July 2012** and the performance data is given below;

Present Flow to STP: 200 m$^3$/day

- **Results of Lab Analysis (24 July 2012)**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Inlet of STP (mg/l)</th>
<th>Outlet of STP (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH at 25$^\circ$ Temp.</td>
<td>6.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>442</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Biochemical Oxygen Demand</td>
<td>510</td>
<td>5</td>
</tr>
<tr>
<td>Chemical Oxygen Demand</td>
<td>1119</td>
<td>13</td>
</tr>
<tr>
<td>Nitrogen Ammonia</td>
<td>31</td>
<td>0.04</td>
</tr>
<tr>
<td>Oil and Grease</td>
<td>17</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Fecal Coliform CFU/100 mL</td>
<td>&gt;1.0x10$^3$</td>
<td>2 CFU/100 mL</td>
</tr>
</tbody>
</table>

![SCADA System of STP](image)

![Top View of STP showing Blowers, Aeration Tanks, Control Panel & Operations Room](image)

![MBR Tank and TSE Tanks of STP](image)