

Egyptian Effluent Standards for Treated Domestic Wastewater: Comparison, Evaluation and Recommendation

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In Egypt, the domestic wastewater in the rural areas is concentrated with a COD (chemical oxygen demand) as high as 1100 mg/l, which is almost two times of that in the urban areas (Elmitwalli *et al.*, 2002). El-sherbiney *et al.* (2001) determined the maximum aerobic biodegradability of the Egyptian domestic wastewater. They found that the minimum aerobic effluent COD concentration of rural areas was almost similar to the Egyptian effluent standards for COD, while the minimum aerobic effluent COD concentration of urban areas was significantly lower than that of the Egyptian effluent standards for COD. Ibrahim (1995) evaluated the applied different technologies for domestic wastewater treatment in rural areas of Egypt. He also found that the effluent of these systems did not comply with Egyptian effluent standards for COD.

In this paper the effluent standards for treated domestic wastewater in Egypt and in other developed and developing countries will be compared and evaluated. Moreover, the state of the art for the criteria for effluent standards for developing countries will be discussed. Finally, applicable recommendations for the Egyptian effluent standards for the treated domestic wastewater and recommended treatment systems will be illustrated.

The effluent standards in many developing countries are copied from that of developed countries, with the assumption to achieve these standards too quickly, without considering the economical and technological capacities (Sperling *et al.*, 2002). Some standards in developing countries are excessively stringent, which leads to increase the distance between desirable and achievable, between law and reality. This result in illegal discharge of wastewater, even without any treatment, to the surface water (like illegal discharge of raw sewage to the Egyptian canals and drains. For decreasing this gap between standards and achievement in developing countries, the effluent standards should be placed to be achieved in a short period and to minimise the pollution. This can be done by implementation of standards in stepwise, in phases, to achieve the final target value for the effluent standards in the last phase. The time required for each phase should be parallel and represent the economical, institutional and technological development in the developing countries. Moreover, the effluent standards for treated domestic wastewater should be divided in classes. The effluent standards for the treated sewage in a large city, like Cairo, should not be similar to that of small communities with less than 100 capita. Most of developed countries have the effluent standards for treated municipal wastewater in classes. Egypt had only one effluent standards for the treated domestic wastewater. The

Egyptian effluent standards for COD is even lower than some classes in developed countries. Moreover, this value is higher than that in most of developing countries.

Based on the effluent standards in many developed and developing countries. The Egyptian effluent standards for treated domestic sewage are recommended to be divided in the four classes.

1. **First class:** for the effluent of the wastewater treatment plants in the cities. The domestic wastewater of the Egyptian cities, which represents the major part of the Egyptian domestic wastewater, is less concentrated as compared to that of villages and, therefore, it is possible to achieve a high quality effluent, if these wastewater treatment plants are operated properly.
2. **Second class:** for the effluent from wastewater treatment plants in villages and this class can have a lower effluent quality as compared to that in class 1.
3. **Third class:** for the effluent of on-site treatment systems for remote houses or communities, which will be installed in any area without any sanitation. This means that any new houses or communities should have pre-treatment facilities.
4. **Fourth class:** for the existing houses in the rural areas without any sanitation. For this class a permissible period of 5-10 years should be applied before application of such class.

Table 1. Recommended maximum permissible-concentration for COD, BOD₅ and pathogen for the recommended classes of the Egyptian effluent-standards for treated sewage.

Parameter	Class 1	Class 2	Class 3	Class 4
COD (mg/L)	100	200	350	350
BOD ₅ (mg/L)	40	80	200	200
Pathogen (FC/100 mL)	1000	5000	10000	10000
Recommended treatment system	Pre-treatment (sedimentation or anaerobic treatment) followed by aerobic treatment + disinfection	Pre-treatment (sedimentation or anaerobic treatment) followed by aerobic treatment + disinfection	Sedimentation tank, septic tank or anaerobic treatment + filter, wetland or pond	Sedimentation tank, septic tank or anaerobic treatment + filter, wetland or pond

These mentioned-classes have to be upgraded and modified stepwise, in each phase, until achieving the targeted effluent standards. The adaptation and implementation of such classes and recommendations in this paper will result in a control and a reduction of the pollution from domestic wastewater in a short period and will reduce the illegal discharge of untreated wastewater to the canals and drains in Egypt.

References:-

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