

Four Major Points to Consider for a Successful ZLD Project!

A good pre-treatment is the key to a successful recycle process.

By Akhil Jugade



WATER, THE VITAL element of human life, has become precious now. Almost all of us have experienced a concern of availability of water in various forms. Agricultural activity in our country uses the maximum quantum of water.

Industrial water consumption accounts for about 20% of the total water demand. If all industrial wastewater is recovered and reused, 1/5th of total water consumption could be reduced. As the treatment facilities upto primary or secondary units exist in most of the industries, recycle and ZLD for wastewater treatment could be utilized with ease.

Wastewater consists of inorganic and organic constituents. Various unit operations and processes are used to remove these constituents.

Typically organic fraction is removed first and dissolved salts are separated using membrane-based processes. Good quality water is recovered in this process. However, concentrated salts are also generated. These concentrated streams are further treated in Multiple Effect Evaporator (MEE) or Mechanical Vapour Recompression (MVR) unit and thus Zero Liquid Discharge (ZLD) of industrial effluents can be achieved.

The concept of ZLD appears feasible. However, it is challenging to practice and, sustain. Cost of recovered water i.e. operational costs are critical in any ZLD project. Hereafter we try to help you with major steps which could make your ZLD projects successful.

A Good Pre-Treatment

A good pre-treatment is the key to a successful ZLD project. As pre-treatment fails, membrane-based processes generate higher volumes of rejects. As a result, the ZLD system requires to be operated for a higher duration. Poor

pre-treatment can also cause irreversible damage to membranes.

Thus, extreme care should be taken while defining and sizing of pre-treatment units. The frequent failures of ZLD systems are observed if the pre-treatment units are curtailed while designing to reduce capital costs.

Effluent Characterization

Appropriate pre-treatment can be designed if the nature of effluent is well understood. Quality and quantity of the effluent can be defined by analyzing wastewater samples and collecting data for wastewater generation. Treatability tests can quantify the performance of treatment alternatives. These simpler steps are found to be missing in most of the ZLD projects. Each effluent is different, even if generated from a same or similar industrial segment/ application, which thus requires an in-depth characterization of wastewater to be carried out for every effluent.

Stream Segregation and Effective Equalization

If consistent feed water

quality is maintained, a membrane-based process works efficiently as designed. In most of the cases, one or more streams with relatively smaller volumes are responsible for the upset of effluent treatment plant. These upsets are reflected in the performance of membrane processes and water recovery. Segregation of such streams can assure consistent water quality after treatment and feed to membrane-based recycle units. Provision of storage and flow control mechanism for such streams could offer flexibility in operations of the treatment plant. Thus, required efficient equalization of all the streams could be achieved at the effluent treatment plant.

Selection of Right Technology

Considering the high operating cost of the ZLD system, it is important to maximize recovery before the ZLD. Selection of proper unit operations and processes can minimize waste generation. Advanced Technologies like EDR can also be effectively used depending upon the effluent characteristics to maximize the recovery.

A good zero liquid discharge system forms a successful shape when these selection checks are considered.

Thermax Limited has successfully supplied ZLD plants in various segments like automobile, brewery, pharmaceutical, textile, chemical, etc. Few of the supplied installations are running successfully for more than ten years.

About the Author

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