

INSTITUTIONAL WATER TREATMENT

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50 M³ hr Reverse Osmosis Plant Installed in Logistic Park, Hyderabad



The global population on the last day of 2021 was 7.91 billion and hurtling towards 9.7 billion people by 2050 with the rate of increase over 156 people per minute or almost quarter of a million a day. The population increase is putting tremendous pressure on the natural resources and it has become significantly important to produce more with less. The impact is severe on water supply as the fresh water resources are shrinking and widespread water pollution is making the availability more difficult. People and businesses across the globe are facing a tough challenge of resilience and sustainability with water.

The ever growing population has increased the complexity of managing water supply. The rapid progress of urbanization and economic activities combined with climate change events; both drought and frequent flooding are leading to an increased focus on the sustainability of our raw water from rain, wells, rivers and lakes. The issue further aggravates as water has historically been unrecognised and undervalued with public expectations that it is a fundamental right to receive rather than a commodity to be managed and paid. Municipal administration and water utilities globally continue to struggle to arrange the required financials needed just to keep their long-lived assets maintained and operational. In most of the cities it is common to see incidents such as water pipeline breaking and sewage overflows that potentially pose acute water shortage and wastewater hazards which raise issues around water quality and availability while impacting public health and the environment. The complexity has grown over time as the result of incremental use of limited resources and releasing the used water into water bodies without any considerations.

Water is at the heart of everything that we do from survival to economic and industrial activities and everything in between. For several hundred years, we had a free run for water as enormous source of freshwater was available. The thing started changing in the last few decades due to mad rush for economic and industrial growth that put tremendous pressure on sacred resources. Industrial activities multiplied year after year and now we have reached to a point where the freely available water has become scarce and precious. The planet earth is on enormous pressure to provide the resources to quench the thirst of almost 8 billion people and their need for food produce and economic development.

A substantial population of the world estimated to be 2.2 billion out of 7.9 billion currently continue to grapple with lack of access to clean and safe water. The situation in India is more challenging than other countries as over 600 million people; almost 44% of total population is suffering due to acute water scarcity and water contamination. In large cities in India where populations are dense and resources very scarce, the gap between the demand and supply of clean water are increasing which is being further aggravated by a governance deficit.

INSTITUTIONAL WATER MANAGEMENT

The institutional and corporate sector invests their resources mainly on production and business expansion leaving the issues of water at bay. But the situation has started changing due to aggravating water crisis resulting in production delays and business losses. Institutional water management is a combination of raw water procurement, adequate treatment and water supply management of the desired quality and quantity. Normally, water of varying quality is received at different point in time and demanded by varying quantities by multiple users within the setup. With all intentions and being a part of water stewardship, the industries and institutions have now started understanding the need for solving the water puzzle with focussed efforts and adequate investment in water treatment and recycling.

Mineral scale deposits such as calcium carbonate and phosphate, calcium oxalate, barium and strontium sulphate, magnesium silicate and others and colloidal inorganic species such as silica present important challenges for process water applications. When silica is left uncontrolled it forms

hard and tenacious deposits that are difficult and hazardous to remove.

Case Study: Water Filtration Plant at Le-Meridien Hotel, Hyderabad

THE PROJECT

Newtech Buildhome Private Limited (NBPL) has developed a 241 room luxury hotel at Hyderabad (Telangana) under the brand of 'Le Meridien' having 241 rooms, 2 banquet halls, 5 different dining options, large swimming pool at rooftop, gym, spa centre and other modern amenities including extensive parking space. After getting statutory clearances, fire safety and occupancy certificate, the hotel became operational from November 2019. With the outbreak of coronavirus and strict health & safety guidelines, the quantity and quality of water requirements increased exponentially.



3672 FRP Pressure Vessel for Industrial RO Water Purification System installed in Le-Meridien



Pic 1.1-Existing Sand Filter System at Le-Meridien

THE SYNOPSIS

The basic working procedure of any pressure sand filter is that water flows into the media present inside a vessel from top to downward direction. As the water passes through the sand and pebbles present inside the vessel, it stops the contamination or suspended solids upto 150 micron while passing through it. The suspended solids which are present in the water are stuck in the sand media and water gets filtered from suspended solids as it passes through it. After a specific amount of water passes through the sand media, it requires a backwash process in which water passes from downward to upward direction so that the suspended solids which were stuck there by the inflow of water can be drained out of the sand filter vessel.

In this case the water was not being passed by the sand filter because of the inattention of the people responsible for maintaining it and not backwashing the sand filter as required.

The vessel that was installed at the project site was a sand filter of 3672 size. The basic principle of any sand filter is that it requires multiple sizes of pebbles and quartz to filter the contaminants in

The 'O' Ring of air release valve that has been stretched due to extraneous pressure was fixed and placed to make it functioning properly as required.

water. On the bottom layer the large size pebbles are layered so that the water can pass through without any hurdle. But the existing sand filter had only 10-20 mm size of pebbles present in it and as a result the required amount of water was not passing through it.

THE ISSUES

There was a disruption in water treatment facilities that the hotel has

installed due to reasons of filter media not functioning as expected. The following issues were detected:

- ❖ The sand and pebbles inside the sand filter vessel was completely converted into big rock which was impossible to take out from the vessel. As you can see in the image (Pic 1.1) only the suspended solids which were stopped by media from the flowing water can be seen and rest of the media has been crushed and altered to become the rocks.
- ❖ The media of the sand filter converted itself into a solid rock as the required backwashing of the sand filter was not done and it continued to be used in filter mode for over a year without considering the maintenance of media and cleaning it. With consistent use and rocks getting bigger and bigger with the accumulation and even after it was blocked completely then the sand filter was running in bypass mode.
- ❖ The distribution system or strainer through which the raw water has to pass was also completely blocked with suspended solids due to continuously running the sand filter without backwashing it.
- ❖ The problem slowly snowballed and finally the filter stopped working altogether.

THE SOLUTIONS:

The engineers deployed by the Sahara Industry inspected the filtration plant and concluded that the filter media has completely stopped functioning. The solution was not simple due to massive issues and needed extra-ordinary solutions. The team working on the site was not able to extract the filter media from its designated place and had to cut open the vessel from outside so that the media present inside of the vessel could be taken. But the contamination of water got the media jammed and so stiff that even



Pic 1.2-Cut Open Sand Filter Vessel at Le-Meridien

after cutting the vessel, it was not able to be taken out of the vessel, as you can see in the image (Pic 1.2). The giant rock that formed inside the vessel had to be broken into pieces using the high capacity jackhammer machine but in the process, the vessel was completely destroyed.

To make the water treatment plant functional again, a new vessel and sand filter was installed. The process of re-establishing of the filter plant included several remedial and retrofitting exercises, such as:

- ❖ The existing sand filter was cut down, jack hammered and pulled out of the space where it had existed to make way for the new one to be installed making the water treatment system functional again.
- ❖ The lower and upper pipes and fittings of the multi-port valve were carefully removed without dismantling the entire set so that the pipeline remains the same as it was before.

- ❖ A new FRP Vessel of Alfa Aerosol of the same size 3672 has been installed with the same diameter of pipeline.
- ❖ The media with multiple size pebbles, quartz and fine sand has been used to fill the sand filter vessel.
- ❖ A new distribution system has been installed at the bottom of the vessel so that the water can freely pass through it.
- ❖ The filter has been open backwashed before fitting inside and then programmed to be running in filter mode after fixing all the pipelines and making it functional.
- ❖ The 'O' Ring of air release valve that has been stretched due to extraneous pressure was fixed and placed to make it functioning properly as required.
- ❖ The running pressure of sand filter was checked at the rate of 5-6 kg/cm² that causes the leak from the pipeline system as the water being blocked at carbon filter and as per assessment by engineers, it was found that multi-port valve and carbon filter were also broken and have to be replaced with the new ones accordingly.
- ❖ All leakages and tears have been sealed and repaired and the sand filter is made running properly without any error.

WATER SOLUTIONS BY SAHARA INDUSTRY

Sahara Industry is one of the leading water treatment solution providers in India. Having been in the water industry for about two decades, it has contributed immensely by making water safe for drinking, industrial and institutional purposes. In the rich legacy of 20 years, it has executed water and wastewater projects in the length and breadth of India as well as in several other countries.

The ISO 9001:2015 certified company; it has employed technologically advanced machineries and manufacturing solutions combined with professional engineers and well-qualified teams to achieve the rare feat of being an indigenously creator of advanced water and wastewater treatment solutions matching with world standards.

It has carved a niche as one of the home grown leading and most preferred water and wastewater treatment plant solution provider and manufacturer of highest quality equipment and filtration systems. Being market oriented and with modern system and processes, it has a client-centric approach that has helped it growing rapidly while gaining a long list of reputed clients from all over the world. The technical expertise and in-depth understanding of the water sector, coupled with high quality products and excellent service standards, enabled it to offer the best integrated and strategic approach to industrial and municipal water and wastewater treatment systems. The Company provides multi-disciplinary water and wastewater treatment and engineering services and delivering ideal solutions based on the experience of implementing hundreds of plants and projects with integrated project approach.

About the Author

Mohammed Abdul Rahman, the young entrepreneur with an MBA in marketing & finance, is the Founder & CEO of Sahara Industry, providing technologically advanced, economical yet best quality water and wastewater treatment solutions. His success lies in his dynamic leadership and his company has achieved turnover of over INR 1000 million.

To know more about the contributor of this case study, you can write to us. Your feedback is welcome and should be sent at: deepak.chaudhary@eawater.com.