3. Sludge Separation System

The sludge pump is activated each time the feed pump stops, with suction from the clarification bottom drain. The pump discharges through a hydrocyclone with overflow back to the bio-reactor, while the concentrated underflow is discharged to the sludge storage. When necessary, the sludge is emptied and evacuated on to a truck and hauled away for sun drying.

4. Equipment Specification

The basic system comes with the following standard equipment:

A mild steel tank coated with FRP / GRP consisting of a framework of square pipes and vertically stiffened sides and partitions. The tank is internally coated with tar epoxy and externally painted in white with Canadian Crystalline name and logo in one foot high letters on two sides.

A free floating plastic bio-film carrier medium is in each bio-reactor. 2/3 filling rate as standard, with 100 square feet bio-film surface per cubic foot reactor volume.

A plate separator system of 60 degrees with inclined PVC plates in the settling tank. Three plates per foot length, projected area 5 square feet per square foot tank surface.

One regenerative blower or rotary lobe blowers as appropriate, air filter/silencer on the blower inlet, muffler on the outlet for flow regulation. Air header in galvanized steel and air distribution system in PVC as required.

Two open impellers, stainless steel, close coupled centrifugal process pumps with carbon/ceramic mechanical seal and viton elastomers. Waste water pipes in galvanized steel or PVC as required.

One main electrical switchboard / control panel with start / stop buttons and running lights. Automatic start / stop or process pump on high / low level, control of pH agent supply.

Advantages of using Canadian Crystalline 'Silver Stream' MBBR

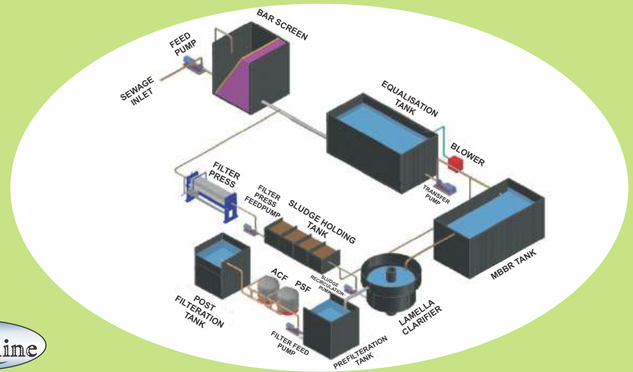
1) The wastewater transportation cost from the facilities to municipality's sewage treatment plant can be reduced.

2) Treated water can be used for toilet flushing, irrigation, car washing, curing water for concrete and so on. Fresh water feed for these purposes can be saved. Since treatment plants can also be transported loaded on a trailer, they can be used for other location and construction sites.

3) In residential areas where sewer pipes are not connected, domestic wastewater generated must be evacuated on tanker trucks to a public sewage treatment plant for treatment. Treatment of wastewater by the MBBR reduces the amount of sludge to approximately one third (1/3) compared to activated sludge Technology.

4) Canadian Crystalline "Silver Stream" MBBR uses less electricity consumption, in comparison with the other treatment systems, thereby reducing power cost.

WASTE WATER TREATMENT MBBR TECHNOLOGY



TECHNICAL DATA OF CC 'SILVER STREAM' MBBR

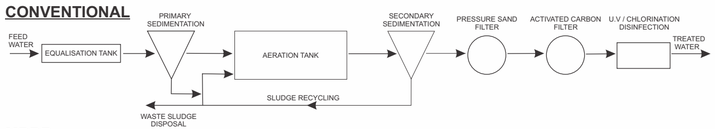
Equipment	Specification	Unit	10m³/day	25m³/day	50m³/day	100m³/day
Tank Container	Overall dimentions	Inches	238 ½" x 96" x 102"	238 ½" x 96" x 102"	480" x 96" x 102"	680" x 120" x 102"
Centrifugal Pumps	Nominal Capacity	M3/hr	1.0 m3/hr	1.5 m3/hr	2.0 m3/hr	4.0 m3/hr
	Pressure	Psi	28	28	28	28
Metering Pump	Nominal Capacity	LPH	6	6	6	6
	Back pressure	Psi	60	60	60	60
Electrical System	Installed effect	Kw	6	9	12	15

* Larger Capacities above 100 KLD are also available in our range

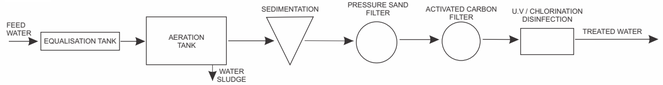
Quality of Effluent	BOD	COD	TSS
Raw Effluent	250 ppm	700 ppm	100 mg/ltr
Treated Effluent	< 30 ppm	< 150 ppm	< 30 mg/ltr

MBBR VS CONVENTIONAL

CONVENTIONAL



MBBR



Silver Stream®

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Canadian Crystalline

Save Tomorrow's World, Today

GREENER ENVIRONMENT
GREENER WORLD
POLLUTION CONTROL | WATER RECYCLING

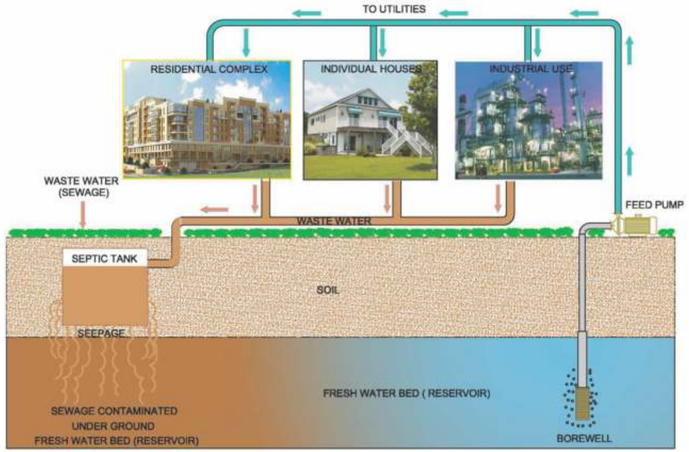
Low Cost
Low Power
Low Maintenance
Less Space

MBBR Technology

Silver Stream®

Canadian Crystalline

ARE YOU DRINKING SEWAGE CONTAMINATED WATER ?



Canadian Crystalline 'Silver Stream' MBBR Technology At A Glance

The Canadian Crystalline “Silver Stream” industrial WWTP technology systems are based on the Canadian Crystalline High-Speed bio-degradation and sedimentation technology which is unique due to its compactness and performance in respect of volumetric efficiency. These technologies are combined in a prefabricated, skid mounted or containerized tank system with variable length, which is mobile / compact and easy to transport anywhere.

The skid mounted system is designed for indoor installation with proper ventilation. The machinery is placed uncovered on the skid at one end. The units can also be placed outdoor under shelter with natural ventilation. These units are transported in ISO freight containers and are manufactured in lengths from 20 to 40 feet.

Canadian Crystalline Site Mounted Systems

Canadian Crystalline “Silver Stream” MBBR systems comes complete with one or two bio-reactors and one clarifier tank. They are best suited for medium organic loads and strict effluent requirements and fit for direct discharge to the environment. Any combination of hydraulic and organic load can be accommodated by using multiple container plants with standard containers in parallel or customized containers in series.

Canadian Crystalline newly developed technology has high efficiency, consumes less power and is more compact.

About our Canadian Crystalline ‘Silver Stream' MBBR

The Moving Bed Bio-Reactor unit (hereinafter referred to as "MBBR") can treat domestic wastewater generated from

✓ Residential Apartments	✓ Commercial Complex	✓ Labour Camp / Defence / Refugee Camps
✓ Public Amenities / Convenience	✓ Factories / Industries	✓ Resorts & Clubs

1) DIMENSIONAL CRITERIA

Any treatment plant must be based on actual measurements of the waste stream with respect to hydraulic and organic load. The critical parameter is daily average flow, peak flow and influent / effluent BOD and TSS.

For common applications in Sewage Treatment Plants for pulp and paper, dairies and other applications in the food processing industry, there is sufficient experience at hand in order to design a system and guarantee the effluent, based on the information provided by the client.

Designs for new applications should be based on a full waste water analysis and followed up by a test program in order to verify the design and guarantee the quality of effluent. Such tests may range from bio-degradability testing in laboratories to pilot test on site.

2) Canadian Clear “Silver Stream” MBBR is "Low maintenance cost" "Space saving" "low initial cost" advanced water treatment system, by combining active sludge treatment and Floating Media Bioreactor Systems.

3) Canadian Clear “Silver Stream” MBBR adopting media process, requires less space and yet provides higher treatment performance compared with the conventional treatment systems. That is why the MBBR is ideal for places with limited space, and for recycling of treated water for drip irrigation, landscaping, toilet flushing, road compacting, curing of concrete, etc.

4) Raw sewage treatment capacity: from 10 KLD to 100 KLD in containerized form and 200 KLD to 100,000 KLD at site construction are available in the range of Canadian Clear “Silver Stream” Systems.

Features of Advanced Technology Canadian Crystalline 'Silver Stream' MBBR

Canadian Crystalline “Silver Stream” MBBR has the following special features, compared with other treatment systems

1) Easy Operation and Low Maintenance Cost

Clog-resistant: Free Floating Media

Easy inspection: Floating Media is loose and free for cleaning and inspection

The media based flocullation ensures increased surface area with no need to pay attention to Sludge control and sedimentation.

Periodical maintenance of media is carried out by maintaining MLSS and sludge volume only.

Operation and maintenance of MBBR is very simple.

2) Space saving (Low footprint)

Operating with a high concentration of Mixed Liquor Suspended Solids (MLSS), the MBBR process requires only a small reaction tank followed by a settling tank or clarifier for large volumes. Therefore the required area for Canadian Clear “Silver Stream” MBBR process will be only one third (1/3rd) of the activated sludge process.

Canadian Crystalline “Silver Stream” MBBR, when catered to large sewage treatment for cities and municipalities saves space, thus reducing the cost of the project drastically, as worldwide the real estate value is consistently escalating.

The retention time for the treatment is considerably reduced compared to Activated Sludge Process. Thus the Canadian Crystalline“Silver Stream” MBBR is a compact design.

3) Low Cost

Simple and compact design leads to initial cost savings.
Reduces sludge disposal costs as minimum quantum of sludge is produced

4) High Reliability

Canadian Clear “Silver Stream” MBBR uses PP Floating Media using advanced resin processing technology.

5) Energy saving

By increasing the surface area in the Aeration Pond using floating media, the area of oxidation becomes less and blower energy requirement is also low.

6) Floating Media:

Floating media can be utilized in new or old bio-reactors and enhance performance, Once the media is placed inside a bio-reactor and set in proper operation, you have a completely stable, clog-free bio-film reactor.

Micro-organisms, which are attached to the floating media reduce the organic load . This is a fixed-film process where the floating media become carriers that build a floating bed in the water (The Bio-Film) and stabilize WWTP.

The Bio-Film grows on the bio-media surface that moves along with the water inside the reactor chamber and the floating media carries the bio-mass, also known as MBBR Moving Bed Bio-Reactors.

Once submerged inside the bio-reactor, the floating media operates as non-clogging media. No channels or dead spots as in other technologies. The movement is caused by either aeration, or mechanical stirring, depending on reactor design and effluent requirements. The floating media optimizes growth (bio-mass), and provides shelter and protection for the bio-mass and makes the WWTP extremely robust and reliable.

The floating media has been extensively tested and implemented into numerous wastewater plants worldwide. The floating media has proven to be superior to any known bio media and can handle pH variation, shock loading and cold temperature which drastically reduces the plant size. The Canadian Crystalline Bio-Media has proven to stabilize most wastewater plants.

Floating media represents flexibility and new-engineered potentials in wastewater treatment plant operation. Use in the existing tanks, upgrade existing plants and for efficient BOD, NH3-N and TSS removal without tank expansion.

Floating media provides flexibility in design and use for aerobic and anaerobic systems. Use existing tanks, modernize existing system to meet effluent requirements.

7) Capacities

The 3 compartment system has the following nominal capacities at an influent of TSS 200 ppm and 95% cleaning efficiency in terms of BOD.

The 2 compartment system has the following nominal capacities at an influent of TSS 500 ppm and 80% cleaning efficiency in terms of BOD.

8) Movable unit

Canadian Crystalline“Silver Stream” MBBR up to 200 KLD capacity can be transported because of its compact size Therefore, it can be transported to other sites after project termination and can be reused.

9) Easy installation

Since Canadian Crystalline “Silver Stream” MBBR is a prefabricated plant, only joints, piping and wiring works are required at site. Therefore, installation work is easy and installation period is short.

10) Less sludge volume

Volume of generated sludge is reduced to half (1/2) compared with Activated Sludge Process because MBBR can be operated in conditions with less surface area and also due to higher MLSS, thereby producing less sludge.

Canadian Crystalline 'Silver Stream' System Configuration

1. **Features of process**
   ASP by extended aeration is a process that combines equalization and aeration.

2. Facilities:
I. Primary Treatment facilities:
Raw Effluent Collection Sump (can be provided by the Buyer)
The collection tank can be provided underground or overhead reservoir can be built at site or the existing tank can be used for collection of sewage / effluent from various points

Raw water pump
One Raw water submersible pump is installed in the raw water septic tank / Equalization Tank . The sewage water is collected in the raw water septic tank / Equalization Tank after passing it through the inlet screen. The pump is operated automatically according to the water level in the anoxic tank.

Inlet fine screen
The inlet fine screen is installed on the Equalization Tank. The slit size of the screen is 6 mm. The screen removes fine substances contained in the wastewater such as toilet paper, hair, etc. to prevent clogging and/or scratching of membrane. Screened water flows to the Equalization Tank by gravity. Screenings are scraped automatically / manually and discharged.

1. Equalization And Holding System

It is assumed that the waste water piping system ends in a customer provided three-chamber combined buffer / pumpwell / sludge storage tank system prior to the Equalization Tank. The buffer capacity must be sufficient to level out the daily peak flows and hold sufficient water for preservation of the bio-culture during weekends. The holding capacity of the system depends on the weekly flow profile.

2. Biological Treatment System

The treatment plant will take suction from the pumpwell by its own feed pump. The pump is level controlled and has a capacity of 1-2 times the average to daily flow. The plant has therefore an intermittent working mode in terms of hydraulic flow, while the air blower supplying air to the bio-reactors is continuously run.

The change in bio-degradation reactor comes in one or two stages depending on required cleaning efficiency. Plants with higher cleaning efficiency of 80-85% need a two stage system. The bio-reactors degrade the dissolved organic matter by oxidation into carbon dioxide which escapes to the air, and to produces biomass which acts as activated sludge. The Silver Stream MBBR uses inhouse developed suspended free floating bio-film carrier media, which provides a large protective bio-film surface to host the bacteria and simultaneously accumulates the active bio-sludge inside the carrier elements. Thus, the system takes advantage of both the fixed film and the activated sludge bio-degradation principle, offering high volumetric efficiency.

The bio-degraded water flows into a clarification stage where the suspended solids settles by gravity. The water is directed through a skim well to a plate settler system which provides the final clarification of the effluent. For systems with high cleaning efficiency, the sedimentation may be enhanced by the addition of polymers.