



BIORULLI

Biological wastewater treatment
systems



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The two most well-known processes for biological treatment of sewage and industrial wastewater are:

a) activated sludge; b) trickling filters.

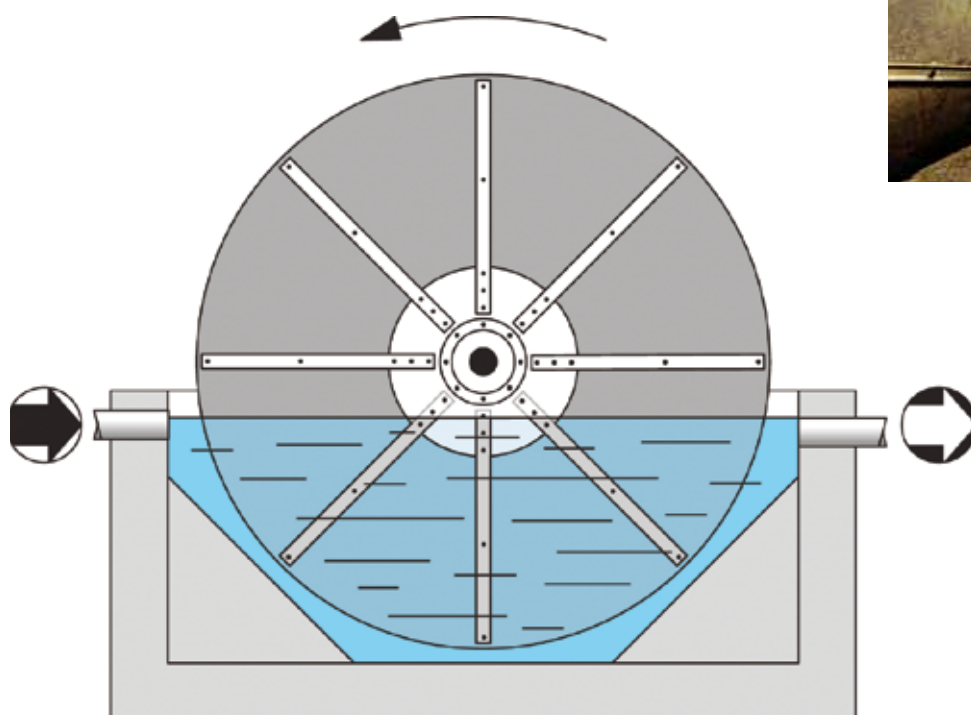
Biological oxidation plants employing rotating disk contactors are derived from both systems and represent a valid alternative to them since they make use of the best characteristics of both processes.



OPERATING PRINCIPLE

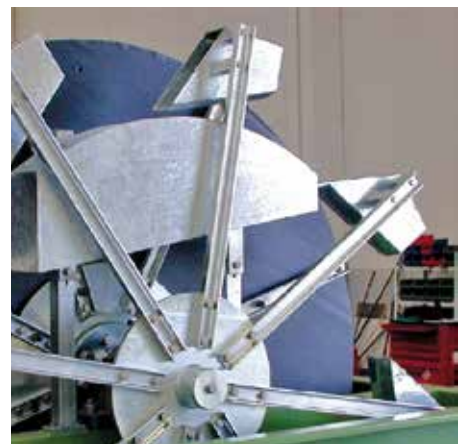
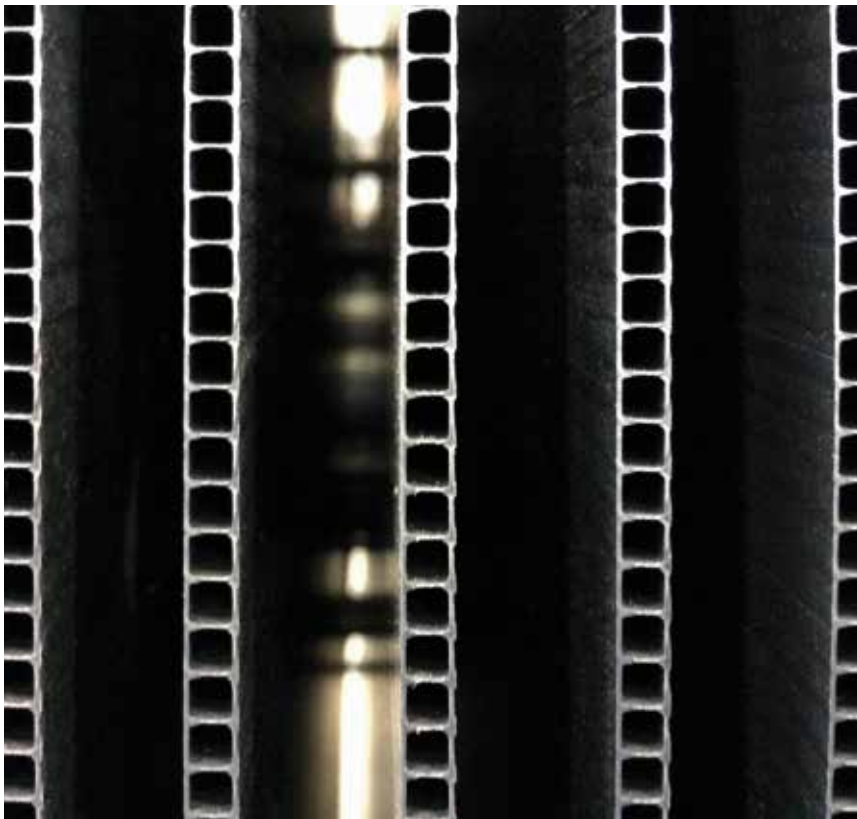
The biological contactor is composed of a suitable number of plastic discs, mounted and closely spaced on a shaft. The shaft is slowly rotated by means of a speed reduction gearbox (1 to 5 rpm), the speed being dependent upon the diameter of the discs and on the waste characteristics of the sewage or wastewater to be treated. The discs are rotated in a partially submerged position (40%) in the wastewater so that the alternate exposure of the contactor surfaces to the waste-

water (from which the micro-organisms obtain their organic nutrients) and to the oxygen (the other element necessary to the process) in the surrounding air causes the growth of a biological film (slime layer) which coats the contactor surfaces 5-15 days after plant start-up. The usage of rotating contactor surfaces thus coated with their biological slime layer also increases the oxygen transfer. Key characteristics red to the wastewater in the tank.



KEY CHARACTERISTICS

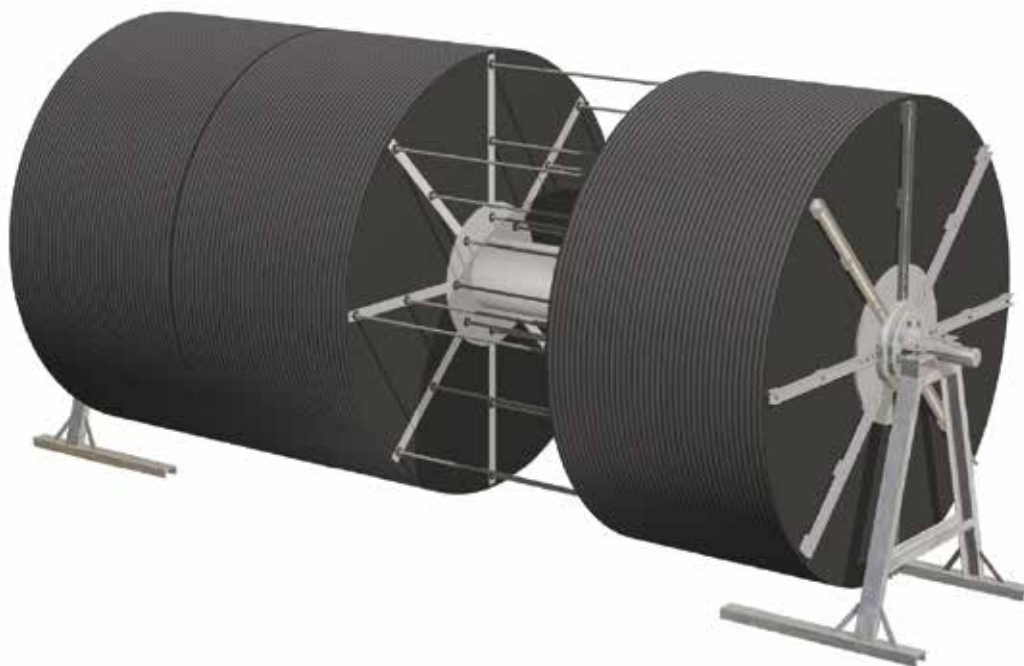
- The system is operative within 5-15 days of start-up without any seeding being required
- The operation of a Rotating Biological Contactor (RBC) is unaffected by low influent flowrate even when protracted over a period of several days. When normal load is reapplied, full capacity is re-established within a few hours
- The RBC is not sensitive to sudden shock variations (upwards or downwards) in biological or hydraulic loading rates, even when these have a duration of many hours: the plant will still achieve the design performance
- Electrical power consumption is very low. A Rotating Biological Contactor's average power consumption is 1 kWh per 3-4 kg of removed BOD5
- The low rotation speeds ensure noise-free, vibration-free and "aerosol" free operation
- Maintenance and running costs are practically inexistent: wear of mechanical parts is negligible and no dosing of additives or reagents is required
- The system does not require any operating personnel since no control or adjustments are necessary: it is self-adapting to flow and load variations.



CHARACTERISTICS OF PP DISCS SERIES

The design and construction of the **PP discs** manufactured by MITA Water Technologies are the result of more than 35 years of successful experience in their usage in biological treatment plants within and outside Italy. Their most important characteristic is a very high resistance both to mechanical stress and to chemical reagents, thanks to the particular construction materials and shape. The discs are derived from sandwich panels of **isostactic polypropylene** treated with a U.V. stabilizer. The sandwich panels form multiple parallel passages, thus increasing significantly the specific surface and at the same time improving the availability of oxygen to the wastewater to be treated.

A very important structural feature is that the discs are built as single-piece items, the only exception being the B 290 series (made in two pieces).



CARATTERISTICHE DEI DISCHI BIORULLI SERIE PP

MITA Water Technologies manufactures herself the components of the system and owns the registered trade mark **biorulli**®. The **biorulli**® offer the following advantages:

- discs manufactured in a single piece
- no shaft power drive unit, gear drive nor related supports ever come in contact with the sewage to be treated
- the shaft-discs assembly (package) can be compounded or divided into two, three up to four stages in order to improve the performance of the plant by the growth of biological films having

different and selective properties as a function of the nature of the wastewater

- due to their small overall dimensions the **biorulli**® can be easily and economically covered with a simple shed in such a way as to permit satisfactory operation even if the outside temperature is below 0°C;
- silent and vibration-free operation without unpleasant odours or nuisance from insects;
- monitoring and maintenance are practically inexistent: two hours of inspection per week have proven to be more than adequate.



SECTORS OF APPLICATION

During several years **MITA Water Technologies** has applied **biorulli**® to many biological treatments both for domestic waste and highly polluted industrial wastewaters coming from:

- Municipal sewage networks
- Dairies, creameries
- Wine producers
- Paper mills
- Oil and petroleum industries
- Dyeworks, laundries, etc.
- Hospitals, schools, airports
- Hotels, camping sites, holiday complexes
- Chemical and pharmaceutical industries
- Factory canteens

- Photo and film processing laboratories
- Motorway service areas
- Food-processing works
- Breeding farms, slaughter houses

Moreover **biorulli**® can successfully be employed in some special applications such as roughing treatment upstream or secondary treatment downstream of any type of existing biological treatment stages (e.g. when influent wastewater load will be increased or changed).

SINGLE-PIECE (PACKAGED UNIT)

The “M” (“Monoblock”) series has been designed and fabricated as a “packaged” unit and is supplied complete with fiberglass reinforced polyester resin, carbon steel or stainless steel basin ready for installation in any location outdoors or indoors. This series has the feature of versatility of installation and use with a consequent considerable saving of layout space. The standard version is supplied as an single-stage plant and, on request, with a special bucket elevator to ensure a constant sewage flow to the discs. It is produced in three principal types which differ only in the diameter of discs (1,15 m, 2,00 m and 2,40 m).

This “packaged” units solution allows both the possibility of a diversity of installation types and ease of removal and transfer to another location, since no concrete foundations or support structure are required. Basins are supplied in fiberglass-reinforced polyester resin (M 115 series) or in treated and painted steel (M 200 and M 240 series). All units are equipped with a fiberglass-reinforced polyester resin cover.



DISC ROLLERS SERIES

The units of this series, designated “B”, of rotating biological contactors consist of a steel shaft on to which sandwich discs of 2,00 m diameter (B 200 series) or of 2,40 m diameter (B 240 series) or of 2,90 m diameter (B 290 series) are tightly fitted (the number of discs varies according to the design requirements).

The whole assembly is solidly held together by tie-rods, radial rods, flanges and spokes in hotdip galvanized steel. The discs are designed for installation in basins of the most suitable format (trapezoidal or semicircular), which can be fabricated in concrete or steel depending upon the requirements of the plant location.

These units can be laid out to suit different flow schemes (in series or in parallel) dependent upon the quantity of sewage to be treated, on the required effluent to influent concentration ratio and on the influent BOD5 value.

The standard version of the disc roller **biorulli**® unit is supplied complete with the rolling bearings and power drive equipment.



TECHNICAL DATA

Monobloc series

Model	Discs diameter (m)	Active surface (m²)	Overall dimensions a x b x h (m)	Motor power (kW)	Input (kW)
M 115-13-1	1,15	130	1,87 x 1,30 x 1,25	0,25	0,20
M 115-25-1	1,15	250	3,16 x 1,35 x 1,30	0,37	0,25
M 115-37-1	1,15	370	4,26 x 1,35 x 1,30	0,37	0,30
M 200-15-1	2,00	750	2,70 x 2,40 x 2,30	0,75	0,45
M 200-20-1	2,00	1.000	3,20 x 2,40 x 2,30	0,75	0,50
M 200-30-1	2,00	1.500	4,15 x 2,40 x 2,30	0,75	0,60
M 200-40-1	2,00	2.000	5,10 x 2,40 x 2,30	1,10	0,70
M 200-50-1	2,00	2.500	6,05 x 2,40 x 2,30	1,10	0,80
M 200-60-1	2,00	3.000	7,10 x 2,40 x 2,30	1,10	0,90
M 240-45-1	2,40	3.262	5,80 x 2,80 x 2,80	1,50	1,10
M 240-50-1	2,40	3.625	6,30 x 2,80 x 2,80	1,50	1,20
M 240-55-1	2,40	3.987	6,80 x 2,80 x 2,80	1,50	1,30
M 240-60-1	2,40	4.350	7,35 x 2,80 x 2,80	1,50	1,40



Disc rollers series

Model	Discs diameter (m)	Active surface (m²)	Overall dimensions a x b x h (m)	Motor power (kW)	Input (kW)
B 200-15-1	2,00	750	1,50 x 2,00 x 2,15	0,75	0,45
B 200-20-1	2,00	1.000	1,95 x 2,00 x 2,15	0,75	0,50
B 200-30-1	2,00	1.500	2,90 x 2,00 x 2,15	0,75	0,60
B 200-40-1	2,00	2.000	3,85 x 2,00 x 2,15	1,10	0,70
B 200-50-1	2,00	2.500	4,80 x 2,00 x 2,15	1,10	0,80
B 200-60-1	2,00	3.000	5,75 x 2,00 x 2,15	1,10	0,90
B 240-45-1	2,40	3.262	4,30 x 2,40 x 2,50	1,50	1,10
B 240-50-1	2,40	3.625	4,80 x 2,40 x 2,50	1,50	1,20
B 240-55-1	2,40	3.987	5,25 x 2,40 x 2,50	1,50	1,30
B 240-60-1	2,40	4.350	5,75 x 2,40 x 2,50	1,50	1,40
B 290-50-1	2,90	5.300	4,80 x 2,90 x 3,05	2,20	1,70
B 290-55-1	2,90	5.830	5,30 x 2,90 x 3,05	2,20	1,85
B 290-60-1	2,90	6.360	5,80 x 2,90 x 3,05	2,20	2,00



Technical data not binding





www.mitawatertechnologies.com



Via Emilia 4 - 27010 Siziano (PV) - Italy

Ph. +39 0382 67599 - Fax +39 0382 617640 - info@mitawt.it