BILFINGER WATER TECHNOLOGIES

JOHNSON SCREENS® TRITON™ UNDERDRAINS

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The world's most efficient underdrain system

Exceptional performance as a filter underdrain system utilizing Bilfinger Water Technologies' world-renowned Vee-Wire® screen technology. Available in stainless steel and in PVC, Triton™ underdrains offer maximum surface area to optimize filtration efficiency with the lowest headloss and backwash pump power consumption.

The unique bi-directional flow design provides improved bed fluidization - resulting in better media cleaning, longer filter runs and better overall water recovery.

DISCOVER THE UNIQUE FEATURES OFFERED BY TRITON™ UNDERDRAIN

The Triton underdrain is designed for the collection and backwash distribution of water and air and includes direct retention of filtering media.

With large open area and the lowest headloss, U-shape channel rods and Vee-Wire® filtering media support profiles, the Triton™ underdrain system offers fine slots to suit any filter media specifications.

Vee-Wire® surfaces are part of all the Johnson Screens® underdrain products. Slot widths can be designed and constructed to handle all types of media to suit different needs.

Triton™ underdrains arrive at the project site fully assembled and require no grouting, special handling or special equipment. With a simple installation and the low headloss, Triton™ underdrains are less expensive to install, operate and maintain.

ADVANTAGES

Operators

- Lower energy costs due to reduced headloss and backwash power consumption
- Longer filter runs due better cleaning of filter media
- Better water recovery due to less backwash water required
- Lower lifecycle costs due to the cumulative effect of all of the above

Contractors

- Ease of installation compared to other underdrain designs
- No leveling of laterals
- No grouting
- No special tools or handling

Consulting Engineers

- Proven design that delivers operational benefits for clients
- Ease of installation for contractors
- Computer modeling to insure installation operates as designed
- Process optimization after installation based on computation fluid dynamics analysis throughout the design process

SUPERIOR PERFORMANCE, MEDIA RETENTION AND FILTRATION

With the benefits of the Johnson Screens® product line and vast experience in filtration, Triton underdrains are designed to solve typical problems that occur in filtration plants:

- Smooth, robust and a plug-free retention surface
- Covers entire filter area
- Direct retention of filter media (no support gravel)
- Low cost installation and operation
- Slot opening accommodates all filter media sizes
- Effective washing (air/water)
- Low headloss
- High open area
- Multiple layers of filter media may be used without risk
- Lower through-slot velocity, compared to other designs, reduces the possibility of fines breakthrough
- Reduced number of backwash cycles, resulting in higher production

ROUND TRITON UNDERDRAINS

Round Triton™ underdrains, with an integral flow distributing manifold, is designed for Granular Activated Carbon (GAC) contactor applications that facilitate the removal of organics for the reduction of disinfection by-products.

How it works

The basin is designed with a sloped floor and a center channel, which feeds a center eductor. The Round Triton™ underdrains are elevated off the sloped floor to facilitate the complete removal of the exhausted GAC media from the basin.

The Round Triton™ underdrains distribute a low flow backwash to sub-fluidized the exhausted GAC media. The media moves down the sloped floor to the center channel and is educted out of the basin. The eduction equipment, being placed at the center bottom of the basin, requires an off-center water header and a uniquely designed flow distributing manifold to insure the even flow distribution of water in filtering and backwash mode.

Incorporating the Round Triton™ underdrains and integral flow distributing manifold into a GAC contactor design, allows for the automated removal of exhausted GAC media and eliminates the potential for human exposure to a low oxygen environment.

01 _ Round Triton underdrains with an integral flow distributing manifold
02 _ Flow distributing manifold
03 _ Basin with a sloped floor, center eductor and off-center water header
04 _ Off-set effluent collection/backwash water header
05 _ Center eductor
06 _ Sub-fluidized exhausted GAC media automatically educted from the basin

TRITON UNDERDRAINS HELP SOLVE DIFFICULT AND COSTLY FILTER BED ISSUES

IMPROVED BACKWASH EFFECTIVENESS

The uniform bubble pattern of the Triton™ underdrain system allows for vigorous air/water backwash without media upsets. Improved backwashing results in longer filter runs, less backwash water used and a cleaner, better performing filter bed.

INCREASED FILTER CAPACITY, LOWER POWER CONSUMPTION

The combination of Triton's Vee-Wire® having a six percent open area and 108 percent of the filter bottom covered by the scalloped shape, allows for the lowest headloss across the underdrain, which translates to lower power costs for backwash pumps and filter pumps (when applicable).

The Vee-Wire® offers an essentially plug-free media support surface. This allows for expanded selection of media, compared to alternate designs, and lets the end user have greater flexibility to meet operational demands – now and in the future.

The low profile screen and the elimination of gravel media layers, allow for more room of additional filter media, which results in more effective treatment.

FILTER BED UPSETS ELIMINATED

Backwashing conventional systems can disrupt the support gravel and lead to problems ranging from minor loss of flow efficiency, to a complete system shutdown. Because treatment media rests directly on the face of the Triton™ underdrains, gravel can be eliminated along with the potential for bed upset.

CUT MAJOR DOWNTIME COSTS

When conventional systems experience serious bed upset, the system needs to be shut down and all the support gravel and treatment media must be removed and replaced. Since the Triton™ solves the problem of bed upset, it also eliminates the costly time-consuming rehabilitation cycle.

ADAPT TO ANY FILTER DESIGN

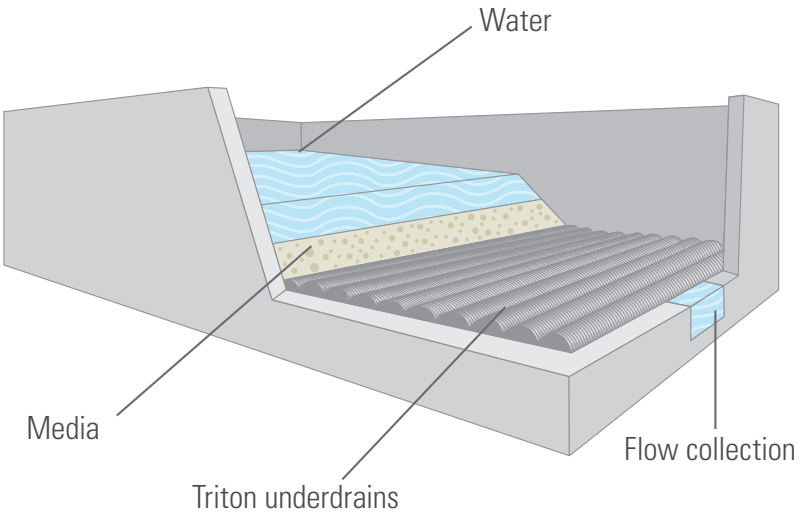
The Johnson Screens® product staff will assist in designing a Triton™ underdrain system that fits your filter size, capacity and budget. They also can provide assistance supplying basic components, handle an installation, retrofit and upgrade.

INSTALLATION FASTER AND EASIER

Triton™ underdrains are lightweight, and under proper supervision, can be easily installed by one or two people. They are supplied as a single piece, ready for installation. There is no special handling or assembly of the Triton™ underdrains required.

Triton™ underdrains are placed directly on the filter floor and do not require special tools for installation. There is no grouting required under and between the Triton™ underdrains.

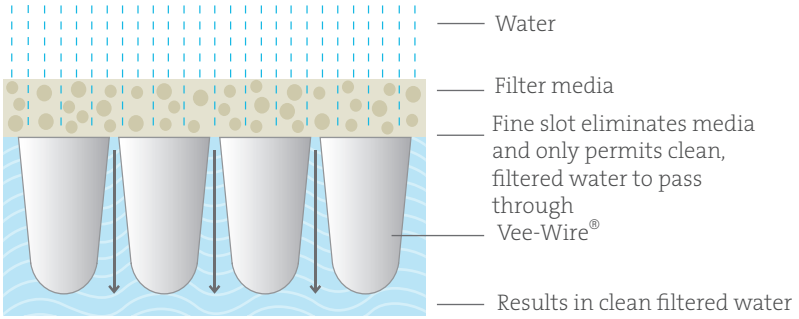
Placing the treatment media is also simplified because support gravel does not need to be purchased or stratified.



FILTRATION TECHNIQUE

The Triton™ underdrain design is constructed in stainless steel or PVC Vee-Wire wound around and welded to "U" shaped channel rods, allowing for a very strong construction.

Plugging problems are considerably reduced, as the wire openings allow only two point particle contact..



COMPARISON OF UNDERDRAIN SYSTEMS

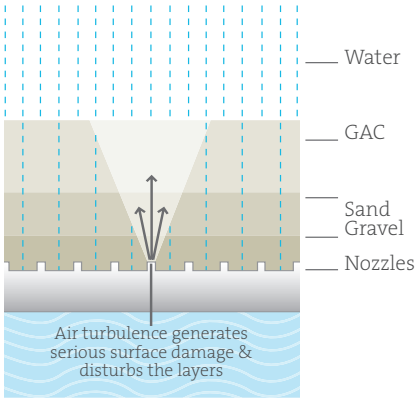
Conventional systems require an intermediate layer of gravel between the treatment media and the underdrains. Vigorous backwashing can cause bed upset, reducing the hydraulic efficiency of the bed and allowing some media to migrate past the filter underdrain.

Triton™ systems retain the media directly, eliminating gravel and potential problems.

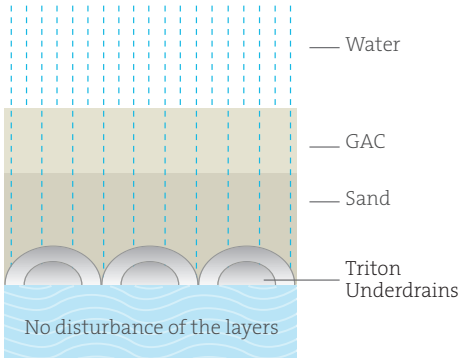
Triton's Vee-Wire® media support surface has a greater open area than other underdrain products, which provides plug-free and low headloss performance.Other manufacturers' products have less open area, resulting in higher pressure drops and increased power consumption and operating costs. In some instances, 1/10th the open area.

The Triton's channel rod, which is below the Vee-Wire® surface, provides for flow distribution during backwash.

The Tee-Pee type is a singular layer of about 1/10th the open area supporting the media.



Example of conventional system



Example of Triton Underdrain system

REDUCE OPERATING COSTS

- A higher capacity system that lasts longer and reduces both installation and operating costs
- Reduced consumption of treated water for backwashing
- Reduced maintenance, repair or shutdown
- Savings in filter height and volume
- No need for a suspended plenum floor
- No need for gravel
- Installation base is reduced, because laterals are factory assembled under ISO 9001 certified manufacturing center
- Installation is less expensive because laterals are fully assembled, require no grout, no special handling and less labor
- Filter design simplified

TRITON™ UNDERDRAIN TECHNICAL INFORMATION

DIRECT RETENTION

Direct retention of most media (sand, garnet, dual media, mixed media, GAC). Material with effective size of 0.007 - 0.008 in. (0.18 - 0.20 mm) can be supported without the use of any support gravel

SLOT WIDTH

Standard slot width is .005 in. (.0127 mm)

PRESSURE DROP ACROSS THE UNDERDRAINS

During backwash @ 15 gpm/ft² = 1.64 ft. (@ 37m³/h/m² = 0.5 m)
During filtration @ 5 gpm/ft² = 0.164 ft. (@ 12.5m³/h/m2 = 0.05m)

FILTRATION MODE

Application rates of 2 gpm/ft² - 10 gmp/ft²
(5 - 25 m³/h/m²) depending on media type and size

TYPICAL BACKWASH

1. Shut off influent into filter and run filter level down to top of media
2. Air @ 2.0 - 3.0 SCFM/ft² (35-55 m³/hr/m²)
3. Air/water wash at: Air @ 3.0 SCFM/ft² @ 4.0 psi (55 m³/h/m² @ 27.5 kPa) Water @ 2.8 gpm/ft² @ 4.0psi (7 m³/h/m² @ 27.5kPa)
4. When the water reaches the bottom of the filter trough, shut the air off and wash at the high water rate of 15-20 gpm/ft² (35 – 50 m³/h/m²) (based on media design and temperature)

TRITON™ UNDERDRAIN DIMENSIONS

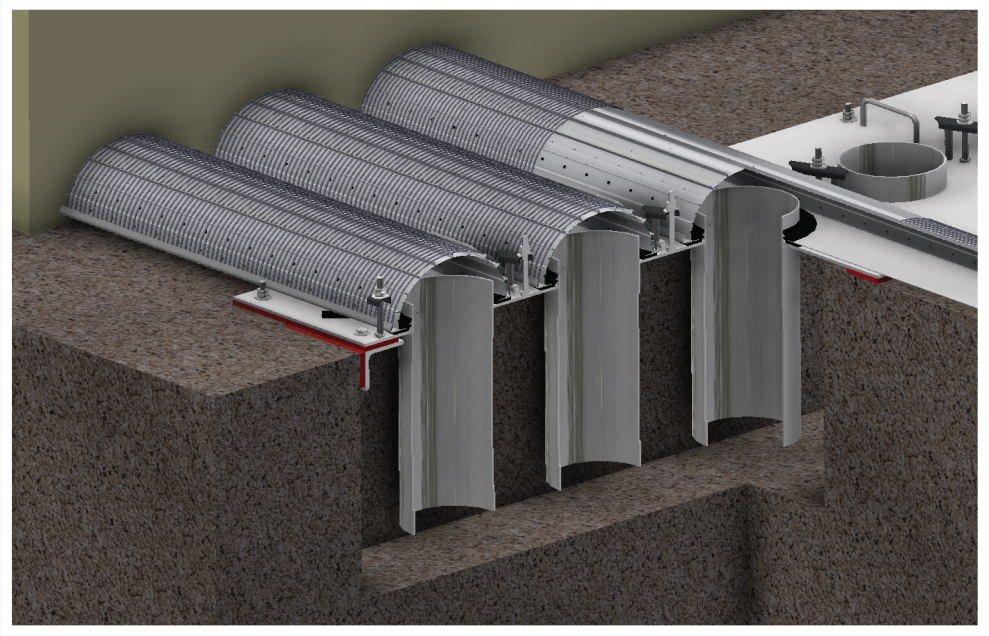
Approximately 5 in. high x 10.25 in. wide x custom length (127 mm high x 260 mm wide x custom length) based on filter basin application. Note: Factory should be consulted if lateral exceeds 20 ft. (6 m)

AIR/WATER FEED

Either center or end feed connections can be supported. Air can be fed from the bottom or the top

MATERIALS OF CONSTRUCTION

304 or 316L stainless steel or PVC



TRITON™ UNDERDRAIN F.A.Q

WHAT IMPROVEMENTS DO TRITON™ UNDERDRAINS PROVIDE?

- Even air and water distribution
- Trouble free operation - no support gravel layers
- Simple to operate
- Installation and operational savings – no field assembly or grouting and very low pressure drop

WHAT IS THE COST?

Upon request we are able to provide prices for your individual requirements of material and underdrain length to suit your application.

HOW ARE THE SAVINGS ACHIEVED?

- Reduced water consumption due to more effective air/water backwashing
- Lower headloss – allows longer filter runs
- Lower headloss decreases backwash pump power consumption
- Reduced maintenance of filter media
- Reduced installation cost

HOW EASILY ARE THE TRITON™ UNDERDRAINS INSTALLED?

- Typically installed with two laborers
- No leveling of laterals, no grouting
- Can be retrofitted with minimum alteration to an existing plant
- Multiple configurations available
- No special tools or handling
- Example: 20 x 23 ft. (6 x 7 m) basin can be installed in four hours after concrete has cured.

WHAT IS THE PRESSURE DROP?

Due to the 6 percent open area of the Vee-Wire® surface of the Triton™ underdrains, the plug-free surface is significantly lower in headloss. Typically, the headloss across the underdrain during filtration at 5 gpm/sq.ft. (.677 lps/sq.m) = about 2 in. (50.8 mm)

DOES THE MEDIA INFLUENCE THE PRESSURE DROP?

Yes. The smaller the effective size of the media, the greater the pressure drop.

WHY DO TRITON™ UNDERDRAINS PRODUCE MORE WATER BETWEEN BACKWASH CYCLES COMPARED TO OLDER SYSTEMS?

As material is collected in the media during filtration, the headloss increases. At a certain point, it will reach a terminal point and the filter will require a backwash. The lower initial headloss of the Triton™ underdrains system allows for a longer filter cycle time.

WHAT DETERMINES FILTRATION PERFORMANCE?

The media mostly. The biggest impact the underdrain has on performance is its ability to effectively clean the media so it performs properly. The air/water ability and the direct retention of the Triton™ underdrain system allows for the most effective method to backwash and maintain the performance of granular medias.

BACKWASH: WHAT HAPPENS IN THE ZONES BETWEEN THE TRITON™ UNDERDRAINS?

The lateral holes allow a bi-water flow rate to clean them from both sides. With the Triton™ laterals spaced approximately 12 in. (305 mm) on center, the zone between the laterals is effectively agitated and cleaned.

WHY USE THE PVC TRITON™ UNDERDRAINS?

The PVC Triton™ underdrain has comparable features to the stainless steel version. Triton™ underdrains are available in 304 or 316L stainless steel and in PVC. The material choice depends on the application in terms of corrosivity of the raw water and coagulant chemicals used. PVC is a very good material for corrosion issues and less costly for standard gravity filtration projects.

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