Spring 98'

THE ZABEL ZONE™

AN ONSITE WASTEWATER MAGAZINE

Enjoy Our Great Outdoors

LOOK INSIDE FOR

SMART FILTER™
ALARMED FILTER SYSTEM

ZABEL SAYS GOODBYE

To: Bob Zabel and Stuart Matzke
See Editor's Corner

ZABEL environmental technology™

Protecting our nation's Ground Water

What's Inside

Editorial Policies

The Zabel Zone™ is published in Fall and Spring editions each year and contains articles of interest to the Onsite Wastewater Community as well as information on Zabel products.

The Onsite Wastewater Community does not exist in a vacuum, but is part of the larger culture. Articles may also appear of a general interest that do not directly involve onsite wastewater issues. Articles by guest authors reflect only their opinions and do not necessarily reflect the opinion of the editor.

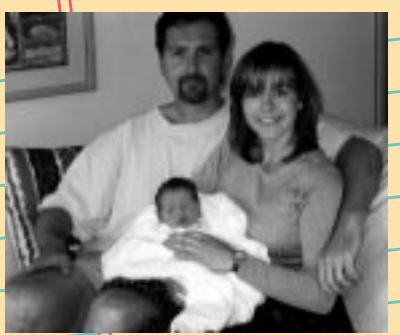
Letters to the Editor will be published as space allows with the editor reserving the right to edit the letters for brevity and clarity. If you would like to contribute an article, please contact the editor at : Voice 1-800-221-5742 - Fax 502-267-8801, or - Email ZABELZONE@AOL.COM

The magazine is distributed free of charge and current circulation is approximately 20,000.

EditorsCorner

Jan M. Nurse, DMD

Zabel welcomes Jan Nurse our new editor. Jan has a DMD from the University of Louisville. Harry keeped bringing home articles for her to edit, so she decided that she should start receiving the credit for something she was already doing.

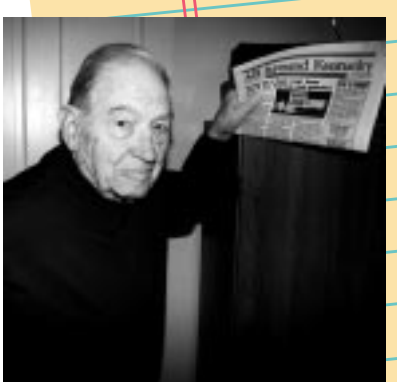


I did not want my first column as editor to begin on a sad note, but sometimes there's no choice. This past year Zabel™ lost two good friends and their passing deserves us taking note.

Last fall, Stuart Matzke of the William Matzke Company passed away. He was a devoted husband, father, son, brother and friend.

Stuart graduated from Mercer Island High School in 1977. He attended the University of Washington and earned an engineering degree from San Diego State. He enjoyed water and snow skiing, hiking in the wilderness and climbing mountains.

He earned the respect and admiration of those with whom he worked who say his leadership will be missed. Above all, Stuart will be remembered as a fantastic man who brought great joy to all who knew him.



On December 6, 1997, just three days shy of his 87th birthday, Robert Zabel, the inventor of the Zabel™ Filter, passed away. Some who knew him will think of an irascible old fellow. He was. Some will recall his great gift for telling a story. He could. I will remember his good, kind heart.

He and my Aunt Gennie were married from April of 1934 until her death in August of 1991. They had no children of their own but became surrogate parents and grandparents for nieces, nephews and neighborhood children.

Uncle Bob began working for his father's company as a septic tank pumper. With his experience, he saw a need for a device to help protect drainfields. This device went through various incarnations before becoming the Zabel™ A-100 that we know today.

It was marketed with limited success until 1990 when he came to Harry with an offer he couldn't refuse . He knew that, in the right hands, the Zabel™ Filter could be the basis for a viable company, but at his age, he felt it needed to be taken by someone younger and with more experience in business and marketing than he. Harry, somewhat reluctantly, agreed, and I think that even Uncle Bob, the inventor and number one believer, was amazed at what the business accomplished in less than a decade. I can tell you he could not have been more proud and I am so glad he lived to see it!

Stuart and Uncle Bob, you will be greatly missed!

ZABEL environmental technology™

1 We presently receive your publication, the Zabel Zone™, and enjoy every issue. Would you please place our Boone, N.C. office on your mailing list.

Deborah Garner
Municipal Engineering Services Co., P.A.

2 Harry,

Just received your Spring/Summer 97 issue. Lots of great articles, technical and general interest. I have been specifying Zabel™ Filters exclusively since Massachusetts revised Title 5, the state septic system regulation in March 1995. From a designer's point of view, it is the best insurance against system failure available.

Paul Saulnier
CIVILized Solutions

3 Dear Zabel™ Industries,

Your '97 Summer issue prompted me to thank you for offering such a good product. A local restaurant had been having drainfield trouble for years. They replaced the drainfield a few times and were running out of room and patience. I happened to get a Zabel™ brochure at that time (10 years ago) so I presented the brochure to them the next day and they didn't have much hope in this chunk of plastic. I could really see how this would work to collect all the grease that is poured down the drains and collected in this filter so I convinced them that it would solve their problems. I installed it in one hour. They called 2 months later and were plugged up so I easily pulled the filter and found at least 10 pounds of grease on it. I then rinsed it using Dawn dish soap and hot water and they were back in business. They haven't had any trouble since except for pulling the filter and rinsing it off.

Brent Anderson
Brent's Septic Service
Fosston, MN

4 Dear Sirs,

Please include me on your mailing list for your Zabel Zone™ magazine. I have read this in the past and found it very enlightening.
Sincerely,

Gary E. Coleman, Jr.
West Bluegrass District Health Department
Harrodsburg, KY

5 Dear Lesley,

Thank you very much for the copy of the Zabel Zone™. Everyone in our office has read your magazine repeatedly and enjoyed it thoroughly. It is extremely well written with articles that even a moderately knowledgeable lay person such as myself can understand and enjoy. Mr. Baumann, our Master Designer, uses your articles frequently as a reference. Please be sure that we are on your mailing list to continue to receive this informative and insightful magazine.
Sincerely,

Diane Krueger, Office Manager
Septic Technology

6 Dear Sirs,

Just a short note of thanks for the wonderful customer service your company provides. We were very impressed with Zabel™ from our first contact with your 800 number all the way through the sale and then your follow-up phone call. If there's a way to extend our thanks to you employees please do so.

Very Satisfied Customers,
Chris and Debbie Graham
Hiawassee, GA

7 Dear Bill,

During a time when protection seems to be a big issue, the Zabel™ Filter should be first on the list when it comes to septic tanks.

We recently had a job stop working 6 months after installation. At first we thought it had to be the sump pump, even though the alarm had not sounded, because water was standing in that area. We dug up the pump tank and everything was in order.

Still not sure exactly what was happening, we uncovered the outlet lid and found the water level at the top of the tank and lid. We pumped the tank level down below the filter's handle and pulled it. The filter was clogged solid with grease and looking in the tank you could see why.

I asked the customer to come take a good look and told him he had sabotaged his system; he had never been on a septic system before and was unaware of the problems that pouring grease down the sink could cause.

I then let him know if it were not for the filter, he would have destroyed his drainfield. He would not have understood if it had been the drainfield instead of the filter. This was a mound system and could have cost as much as two to three thousand dollars to fix.

Not only did the filter protect his investment, but mine also because the system was under warranty.

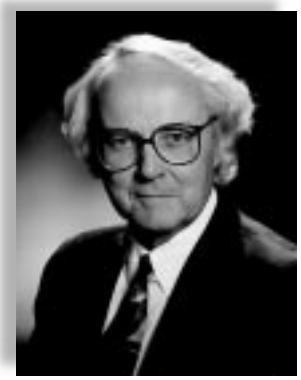
Michael K. McInarnay, President
Jax Plumbing and Septic Tank, Inc.

8 Dear Mr. Rawlins,

I just wanted to write you and thank you for your assistance in providing me the A100 Wastewater Filter unit for my septic tank through the Helping Hands Program. On my limited income, the additional cost of a pumping system or raised field lines was beyond my capability to fund. Mr. Ron Anderson, P.E., Eclectic Engineering & Design recommended it's use and stated it would reduce the cost of the system. Mr. Butch White, Mercer Septic Tank, will be installing the tank and filter. He feels this type of filter will help some of this other customers as well.
Sincerely,

Mrs. Nell Harper
Wetumpka, AL

STRONG REGULATIONS AND THEIR IMPORTANCE TO MANUFACTURERS, INSTALLERS AND PUMPERS



Joseph D. McClees

"On Monday morning, I load my truck to go to work. When I work in four different counties, I have to have four different sets of devices of different sizes and configurations to ensure that I can install these septic systems to the specific codes of the four different counties. Each county has different regulations."

In 1998, one of the toughest things we combat is the lack of good state rules and regulations regarding manufacturing, installation and pumping of septic tanks. Take a breath, I said stronger, not necessarily more.

It is not cost effective to have varying county and city rules that are different from the state's regulations. Having several sets of varying rules that need to be satisfied causes costs to multiply.

I advocate preemption of rules and regulations by the state. Preemption means that the state rules are supreme, that these uniform state regulations are the criteria in each county and only the state legislature can change them. This does not mean there is no flexibility. Differences in water tables, climate, soil types, geographical areas, etc., must always be taken into account.

Manufacturers, pumpers and installers all have problems unique to their business when rules are not uniform.

A manufacturer may need three sets of molds for three counties in which business is done. There may be differing rules regarding pumping procedures in each county and the pumper may not be able to take effluent to one treatment plant that would be accepted at another.

An installer who lived in one county and worked in 3 or 4 others related the following horror story. He was required to have 4 different kinds of material to complete an on-site system, depending on the county. Each was the same house size, bedroom number and had the same size amount of flow and soil types. The only difference was each county's regulations.

After regulations are in place, we must have uniform enforcement or someone will have an unfair advantage. Often, this is the "bad guy" who purposefully disobeys regulations and can offer his service at a lower cost than the "good guy". So, if the state doesn't apply rules fairly, we must holler, complain and make sure our case is heard.

Ultimately, the result is more profit for your business. It will also improve standards and our environment. The public health and environment depend on how well we work together under strong regulations.

Proverbs 29:18 "Where there is no vision, the people perish; but he that keepeth the law, happy is he."

It's a Boy
It's a Girl
It's a...

Look at the offspring that's produced when two great ideas are married.

ZABEL environmental technology™

It's a Smartfilter™

SmartFilter
Prices on Page 59.

MADE IN USA

U.S. Patent 5,683,577
U.S. Patent 5,382,357
U.S. Patent 5,482,621
Canadian Patent 2,135,937
Other Patents Pending

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Richard J. Otis, P.E.
Ayres Associates

DECENTRALIZED WASTEWATER MANAGEMENT

LOOKS GOOD ON PAPER, BUT ...!

Now that I have your attention, let's talk about "Integrated Wastewater Management." What is it? It's about the same thing as 'decentralized wastewater management' except that I don't like that term. It's misleading. Facilities planning in unsewered areas should not be an approach of either sewers or onsite treatment. Rather, the range of technologies should be considered objectively and the most appropriate technology or technologies in combination selected to provide service to everyone in the planning area. Integrated wastewater management is the integration of onsite, cluster and conventional wastewater treatment technologies, as appropriate, within a single public or private utility structure. In other words, retain what is good about municipal wastewater facilities- central management. 'Decentralized wastewater management' focuses on the technology, but it is management that we need. Now you know why I don't like the term.

Whatever you choose to call it, the time for appropriate application of wastewater treatment technologies under central management has come. In places of the planning area where development density is too low for conventional sewerage, properties would be served by onsite or cluster treatment systems. These systems would be the responsibility of the wastewater utility to operate and maintain just as with conventional sewerage. To keep costs affordable, existing components or entire individual onsite systems would be incorporated into the utility. Access to the onsite or cluster systems would be provided through outright ownership or permanent easements to the systems.

Accepting the responsibility for performance of scattered onsite systems on private property is a frightening thought for a utility. How can the utility be sure the systems will work? How will they be monitored and controlled without excessive costs? How will system replacements be accomplished on private property? How can the repair and replacement costs be

anticipated and incorporated into the depreciation budget? These are important questions that need answers.

If the utility is to stay solvent, it better be careful about what existing individual onsite systems it accepts. Incorporating existing systems of unknown design, construction, age, and operating history without some assurance that they still have valuable useful life is foolish. Yet, how can useful life be estimated? It can't with any confidence. But there are some things the utility can do to provide some assurance that the useful life is extended short of rebuilding the system.

Subsurface infiltration systems usually fail because of hydraulic or organic overloads. (They fail for other reasons, but siting, design or construction problems show up in the first year or two.) Before accepting an existing system, the hydraulic and organic loadings need to be controlled. There are two things I would recommend be done on all systems to be incorporated into the utility: 1) installation of effluent filters on all septic tank outlets (with access ports), and 2) installation of a surge shortage tank with timed dosing. Both help to control the organic loading. The filters prevent unexpected discharges of organic solids and the timed dosing spreads the organic loading uniformly over time to allow better soil aeration (see "Balancing Your BOD" in Zabel Zone™, Spring/Summer, 1997). The surge storage and timed dosing prevents more wastewater being pumped to the infiltration system than the system is designed for. As a result, hydraulic overloads are prevented. If water use is excessive or clear water infiltration occurs, the surge storage tank will fill and a high water alarm activated. These are good controls to have on any system!

It's not all work and no play at Zabel™

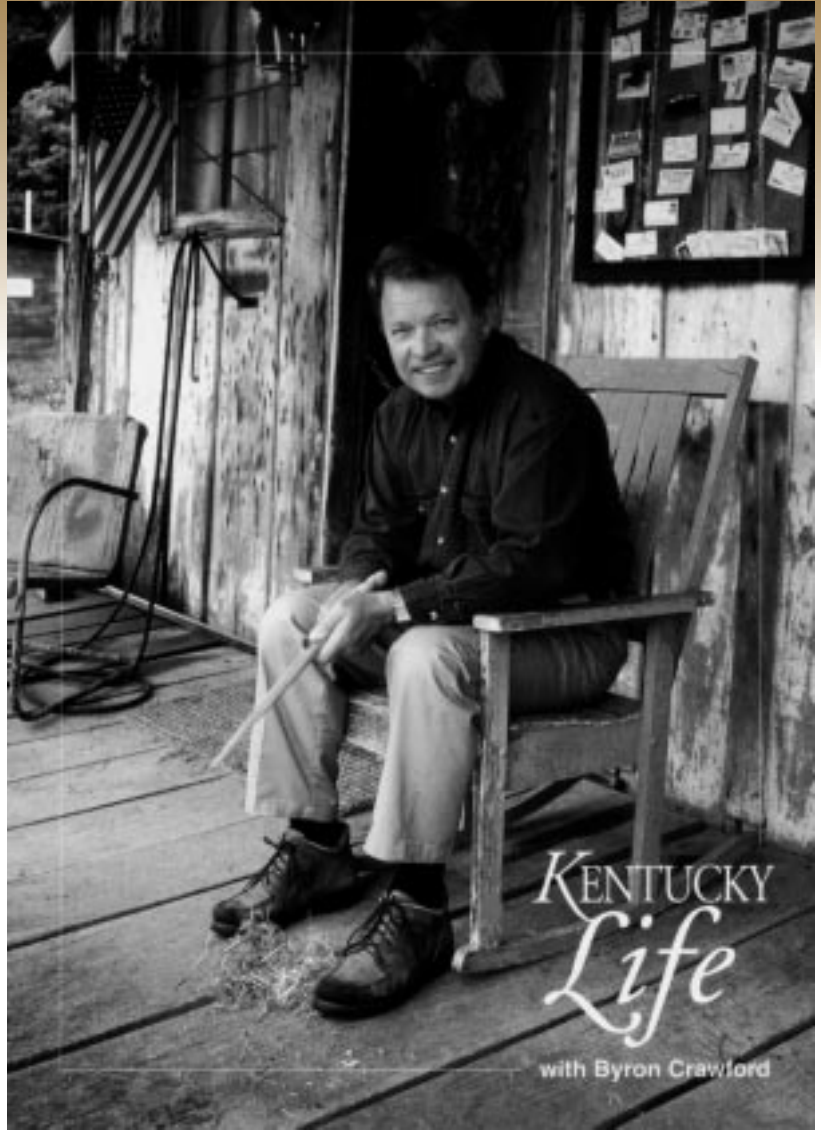
The LaRue County Peanut League Dodgers sponsored by Zabel™ Environmental Technology this season will be going for an unprecedented three-peat appearance in the league tournament championship game. Last year, they not only made it to the championship game, but also took home the championship hardware. The kids left with trophies while Coach Terry left without the mustache he'd worn for 10 years. Coach Terry promised the kids that if they won the championship, they could shave off the mustache right there on the field.

Editor's Note: Okay, Kids, be thinking about what you can get Coach to do for three in a row! Good Luck!

"Go Dodgers"

THE GREATEST FOOTBALL GAME OF ALL

By Byron Crawford



The Monday-morning quarterbacks were huddled around a coffee pot, discussing their most unforgettable football games. I could not help but overhear- and wanted to join them, but didn't.

My most unforgettable game wasn't a game in which I played. In fact I wasn't even there. Almost no one was. But a friend of mine, the wife of one of the referees, was among the handful of people in the stands that mid-October evening in 1980, when two seventh-grade teams tangled on a field behind a school in rural Central Kentucky.

One of the teams was pretty good; the other was pretty bad- so bad that it had not scored a single touchdown the entire season.

That was one of four seventh-grade squads organized as part of the feeder system for the county's strong high school football program. The coaches were teachers who had picked their players. Three of the coaches had chosen the best players available. The fourth, a special-education teacher who didn't know much about football, had chosen with his first pick a stocky youngster with a broad smile who answered to the name "Bubba."

Because of a birth defect, Bubba had no arms below the elbows.

The coach had never been much of an athlete. One of the painful memories of his childhood, he later told my friend, was that he had always been picked last when playground teams chose sides. Maybe that was why his team of seventh-graders was loaded with kids who might always have been picked last; the boy with no arms, a boy with cerebral palsy and several other youngsters whose strength was confined mostly to the heart.

The other three seventh-grade teams were fairly evenly matched, but when one of them played the team coached by the special-education teacher, the result was always a rout.

Although the other coaches never seemed satisfied with their teams' winning performances, my friend had noticed all season that the fourth coach would often give high-fives to his losing players who ran fast and got scratched, or even to those who got grass stains on their uniforms.

Late in that memorable game- with his team down again, maybe 50 or 60 to nothing- the coach called an uncharacteristic timeout. He had decided that Bubba should run the ball, because no one was defending against him.

"Bubba," he instructed, "when they give you the ball, I want you to run like a big dog is after you."

Seconds later, as Bubba clutched the ball between the stubs that were his arms and charged up the middle, it was, my friend said, as though the opposing team was trapped in one of those slow-motion movie sequences reserved for moments magical.

The coach watched with fists clenched against his face as Bubba scampered toward the end zone from about midfield, crossed the goal line, ran between the goal posts, out of the end zone and across the track beyond, stopping only when he reached the fence.

As his teammates embraced their smiling, armless hero and struggled to hoist him into the air for a fitting celebration of their only touchdown of the season, my friend saw the coach- sitting on the bench, his face in his hands, crying. She could see his shoulders shaking.

In that splendid little moment, the Rose Bowl, the Super Bowl and the all-star games could all have been hidden in

the exuberant shadows of a ragtag bunch of mostly 12-year-olds, the majority of whom would never play organized football after that season.

One of the referees that night, who would eventually go on to officiate at the college level, later recalled that he had been prepared to throw a crucial block, if necessary, and risk ruining his future as a referee, to see the kid with no arms score the touchdown of his life.

Football has never been quite the same for my friend since that night, or for me since I heard the story five years ago.

The Monday-morning quarterbacks may have seen some good games, but they missed the best one.

Byron Crawford is a resident of Shelbyville, KY. He is the Kentucky Columnist for the Courier Journal and the Cincinnati Enquirer. He is also the host of the Emmy Award winning "Kentucky Life Series", a weekly magazine seen on KET. He has written two books, Kentucky Stories and Crawford's Journal.

Editor's Note: Byron Crawford will be the luncheon speaker at this years NOWRA Conference.

Rebel's Corner

By Harry L. Nurse Jr.

Parents can get more than a little obnoxious when it comes to complaining about coaches and umpires at little league games. My daughter's softball team regularly beat an opposing team whose parents were constantly yelling at their own coach and complaining about every strike the umpire called. It was more than a little frustrating and, worst of all, they embarrassed their own kids.

On a shopping trip with my wife, I discovered the perfect T-shirt to wear to the next game. It had a picture of a crying baby on the back and said in large letters 'NO WHINING'. I bought a dozen.

At the game later that week I sat with a dozen parents on our side of the field with our bright new shirts. From the stands of the other side, we heard not a whimper, not a complaint. They got the message.

Every time I hear someone in our industry say 'What's in it for me?' in response to an invitation to join or support NOWRA or a state onsite association, I think about those T-shirts.

Exciting things are happening as the onsite industry continues to organize with Georgia, Arizona, Virginia, New York, Utah and a host of other states starting onsite wastewater associations. State septic tank associations like the Alabama Septic Tank Association are changing their names to the Alabama Onsite Wastewater Association to better reflect their new, broader vision of cooperation.

I dream of a future where:

1. Every state has a strong healthy onsite association and they are all affiliated with NOWRA.

2. Regulators, academics and private sector members including installers, contractors and manufacturers work together in the forum of their state association to author state regulations.

3. Industry members give their time and money generously to their state and national associations without thought of an immediate return, but as an essential long-term investment to build a solid onsite future.

Losers ask, "What's in it for me?"
Winners ask, "What can I contribute?"
Life's rewards go to those who are givers without thought of immediate return.
Let's quit whining and play ball!

- ✓Reservations
- ✓Scheduling
- ✓Planning
- ✓Organizing
- ✓Travel
- ✓Registration

May

1st and 2nd, AOWA Trade Show, Caroline Gibson 334-260-0990
4th-7th, AFS Technical Conference & Expo, 205-333-6111
7th, Arkansas Society of Professional Sans, Eddie Herman 870-836-5033
12th-14th, IEHA/IPHA Annual Conference, Linda Read 515-321-9310
20th-22nd, SCHPA, Vicki Zelenko 803-734-5008
20th-22nd, TOWA Conference & Exhibits, Burt Carter 512-473-3200
26th-30th, Roto-Rooter Conference & Expo, Mary Lou 702-882-1773

June

2nd-5th, FEHA Annual Education Trade Show, Seldon Carsey 813-962-0176
5th-7th, Soil & Water Conservation Society Expo, Karen Howe 515-289-2331 ext. 15
12th-16th, ASAE Annual International Meeting, 1-800-371-ASAE
27th-1st, NEHA Annual Education Conference & Expo, 303-756-9090

July

2nd-5th, FEHA Annual Education Trade Show, Seldon Carsey 813-962-0176
7th-10th, GEHA Educational Conference, Henry Gilmer 706-667-4234
30th-1st, FSTA 25th Annual Conference & Trade Show, Bob Lynch 904-454-4030

August

24th-27th, CIPHI National Education Conference, Catherine Graham 613-722-2200 ext. 6306

September

23rd-25th, WV Public Health Association Conference, Joy Gower 304-366-3360
24th-26th, Pumper & Cleaner Enironmental Expo West, Cole Inc. 800-257-7222
28th-30th, IEHA Education Conference, Mindy VanDyke 219-449-7578

October

1st-4th, GOWA, Marsha Bates 912-259-0925
3rd-7th, WEFTEC '98, Nanette Tucker 703-684-2443
7th-9th, Missouri Society of Professional Sanitarians Education Conference, Grace Steinke 314-843-5053
13th-15th, Utility Technology Expo & Conference, Debbie Waid 913-967-7206
22nd-25th, NOWRA Conference, Pam Franzen 800-966-2942
25th-28th, Annual Biological Safety Conference, John Stygar 847-949-1517
27th-29th, Onsite Wastewater Treatment Conference, Joni Tanner 919-513-1678

November

4th-6th, The Environmental Technology Expo, Debbie Fernandez 770-279-4388
6th-8th, Ontario Sewage Liquid Waste Carriers Assoc. Convention, Jim Aitkin 905-689-5585
15th-18th, American Public Health Association Expo, Lynn Schoen 202-789-5600

December

9th-11th, KOWA Conference & Exhibit, Marietta Ricketts 502-769-0312

If you are having a Conference or Expo, and would like the information printed in the next Zabel Zone™ please send your info to us.

"Nashville"

This word means one thing to us!
Undoubtedly the biggest show of the year

With the great name of SJE Rhombus there's always a crowd

Theo and Joe man the Zabel™ Booth

Is there anything prettier than a new pump truck?

Our friends at Delta enjoying the great flow of potential customers

Thanks Tennessee

Name of Conference _____

Date(s) of Conference _____

Contact Person _____

Telephone number _____

Send this form to: Zabel™ Environmental Technology, c/o Tom Jenkins 1999 Conferences,10409 Watterson Trail, Louisville, KY 40299

NEW PRODUCTS: TESTING, APPROVAL AND ACCEPTANCE
PART 2: RESEARCH AND EVALUATION

By Don Alexander

In the last edition of the Zabel Zone™, I wrote about why some products are readily accepted. This time I'd like to consider why some products don't achieve acceptance readily and to begin exploring possible solutions.

Regulators are often characterized as a conservative lot, not inclined to innovation or new ways of thinking. My experience suggests this stereotype is far less true than popular opinion would lead one to believe. Complaints like this are usually offered when someone is having difficulty getting a product approved. When the benefit of a product isn't immediately apparent or isn't supported by well-accepted science, a manufacturer should expect to be greeted with healthy skepticism. This is neither hard to predict nor difficult to understand. The role of a regulator is to protect public health and the environment. When a new product is introduced, the obvious questions are: "What does it do?" and "How does it work?" When there are no answers to these legitimate questions or the answers are based on dubious science or dubious engineering, the regulator should be doubtful and cautious. An impartial evaluation would show that the problem often isn't with the regulator, the product, or even the claims, but rather with the justification for product claims. The distinction is important because it leads to the solution.

Before attending to the issue of product acceptance, I'd like to make a distinction between product approval and product acceptance. There is a world of difference between acceptance and approval and I don't want to create any confusion between the two. Product approval is essentially permission to use a product under defined conditions. Product acceptance is a different critter all together. Acceptance is the recognition of a legitimate use and application for a product. Acceptance will lead to both use and approval of a product, which results in market share and profit. This article will deal with product acceptance, which is what I believe most manufacturers want.

So, how does a company with a product that makes claims that are not intuitively obvious gain acceptance? The simple answer is by supporting their product claims. The more extensive and far-reaching the claims, the more extensive and far-reaching the support that is needed. Depending on the claims and the basis for the claims, the support required might be a full-scale research program or it may only involve a straightforward demonstration project.

There's a big difference between research and demonstration. Research follows the Scientific Method and tries to explain how and why things behave the way they do. It expands the understanding of the nature of things. Research may be classified as either basic research which explores fundamental principles or applied research which seeks useful (but not necessarily practical) ways to apply the discoveries made doing basic research. A demonstration program seeks to make practical the results of applied research. Demonstration projects may also incorporate elements of testing to verify the efficiency of a specific product. NSF International Standard 40 testing is an excellent example.

It may be helpful to think of research and demonstration as two points on a broad scale. At one end of the scale is basic research, in the middle is applied research and at the other end is demonstration. Research (basic or applied) and demonstration are not mutually exclusive but likewise neither are they interchangeable. Consequently, an evaluation protocol may contain elements of research, testing and demonstration.

An example might help illustrate how this applies in the real world. Several years ago, the Acme Onsite Corporation (not their real name) approached the state of Virginia about gaining approval for their new onsite system. The Acme system consisted of a conventional septic tank followed by a pump chamber, which dosed a biofilter. This then flowed by gravity to a soil absorption system. Data submitted on the biofilter indicated that it provided better than secondary effluent treatment. The Acme Company claimed that because of the higher effluent quality, they could safely reduce both the area and the stand-off distances to limiting features in the soil (typically rock or water table) when compared to a conventional septic system.

Approximately six months of discussion ensued. Data were examined. Assumptions were scrutinized. Without going into extensive detail, the system did not comply with many parts of our regulations but nonetheless appeared to be based on sound scientific principles. Peer-reviewed literature was unequivocal that absorption field size could be reduced when effluent quality was improved to secondary or better treatment levels. The literature wasn't clear on how much reduction was possible but the reductions proposed by the Acme Company were not out of line with reductions suggested by even conservative researchers.

The result of the review was a protocol designed to demonstrate that the Acme

system could protect public health and the environment while reducing both the area and depth of good soil necessary for an onsite system. The protocol is largely oriented to demonstration and incorporates elements of applied research. During the course of the demonstration (still ongoing), the Acme Company has been allowed to install a limited number of systems (initially 100 with options to increase to 500) conditioned on system performance. System performance will be evaluated on samples collected from 24 systems over a period of 18 months. Clear siting, design and pass-fail criteria associated with the product were developed for this protocol in sufficient detail that the process could be repeated elsewhere if someone is so inclined. If successful, a regulatory change will be required to update our regulations and allow the Acme system to be permitted on a routine basis.

This may sound like an approval process more than an acceptance process. In fact, it is both. The process involved health department field staff in the permitting and evaluation of these systems. Field staff, supervisors and managers have been trained on the policy, which defines testing protocol, siting and design criteria. Permits for the Acme system are issued locally in a manner similar to septic systems. Environmental health staff have hands-on experience and gain an understanding of how the system works. They also get to review reports on the performance data, which are collected monthly by an independent third party. In the final analysis, the evaluation of the Acme system will include the experiences of our field staff.

Every process bears fruit and this one is no different. As the initial limit of 100 systems approached, I sought comments from our field staff about whether or not to continue the demonstration. The Acme system was intended to provide a tool for our environmental health specialists to better meet the needs of the public. A field manager who responded to my inquiry expressed the sentiment that we continue the testing because the Acme system helped his constituency. Now that's grass roots acceptance!

So, what about systems that make claims that are not supported by well-accepted science or engineering principles? Research, in some cases even basic research, is necessary to support some of the claims being made and that will be the topic of my next article. We'll cover the Scientific Method in some detail and take a tongue-in-cheek look at my pet peeve, the ever-popular "Unscientific Method".

CALLING ALL AUTHORS

If you have an interest that concerns our industry and would like to share it with folks around the country, please send us your article. All articles are limited to 600 words, 400 or less being preferred.

4-color photos should accompany your article, including one of the author.

Zabel's Travels

Harry takes a quick photo of beautiful Laughlin Nevada, before he contributed to the local economy's one armed bandits.

Zabel's™ Harry, Bill, and Theo on a fishing trip having a great time . Marathon, Florida will never be the same.

Special thanks to Captain Kevin Goodwin. 305-289-1667

Good Times at NOWRA

Harry, Theo and Bill work hard for Supervisor Kevin Greene to unload a dragster at the NOWRA show.

Harry lives out a childhood dream at NOWRA'S Texas Night

Kentucky

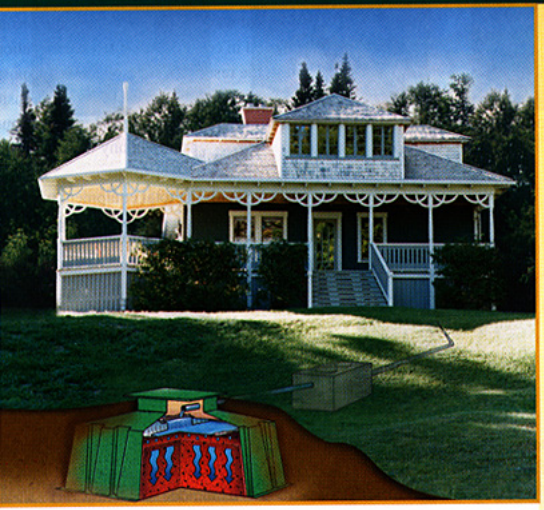
Zabel's™ Tom Jenkins had a good year. The hunting is great in the state of Kentucky.

Hondo, Texas

If you have any photos of yourself enjoying the outdoors, send them in and we may include them in the next issue.

the Biofilter

An Innovative Wastewater Treatment System



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Conventional system

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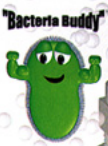

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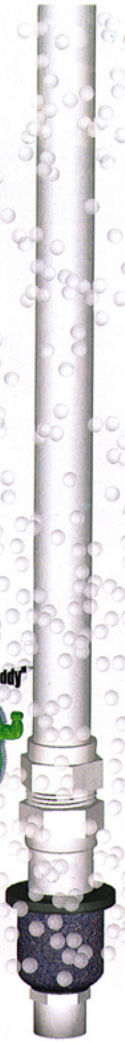

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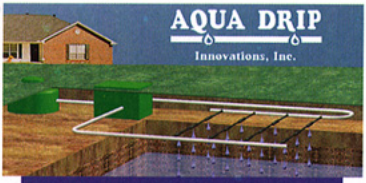

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Assuring Septic System Maintenance Management with Wastewater Filters

by Harry L. Nurse, Jr.

Do wastewater filters solve all the maintenance management problems of conventional onsite systems?

The Spring 1996 edition of Pipeline magazine, published by National Small Flows Clearinghouse, focused on the need for management programs for onsite systems. It reported that state regulators have more confidence in centralized treatment systems than onsite systems because "they have centralized management and oversight and centralized operation and maintenance".

Most industry professionals agree there are three keys to managing properly operating onsite systems. These are design, installation and maintenance.

A proper design usually encompasses environmental factors such as a site evaluation - including climatic, topographical and soil conditions, type of use - residential, commercial or industrial, nature and strength of waste, and hydraulic loading of the system.

There are onsite technologic alternatives to properly design a system for most sites. There is also enough systems design know how to determine when an onsite system should not be used. More and more states are putting management programs in place that require designers to pass specific courses and take continuing education seminars to be certified to practice onsite wastewater systems design.

This is not to say that there is complete agreement about this process and it is true many areas of the country lag behind the learning curve required to provide adequate design management. However, that is a program problem that can be solved through proper state and county codes. Good design information is available.

Just as management of the design process is the foundation on which a successful onsite system rests, a competent installation is also necessary to a properly operating system. Good installation is also dependent on training and monitoring installers to assure that the system has been constructed as it has been designed.

Whether it is an advanced design requiring the installation and setting of complex mechanical components or a conventional septic tank and drainfield, the system will not provide the designed treatment unless a knowledgeable

installer carefully follows the intended design. Again, many states are beginning to require training and certification of installers.

The third leg of this management puzzle is maintenance. It is by far the most difficult of the three to execute. Like designers and installers, service personnel can and should be required to be certified in the skills necessary to monitor and maintain a variety of systems. Some states have already headed down this road with more to soon follow.

The decision to service a system, that is to determine if and when it should be serviced, is usually left to the homeowner. This is the only part of the onsite program dependent on the knowledge and performance of a non-professional. This dependence on the homeowner for service of onsite systems is the greatest contributor to the reluctance of governmental jurisdictions to view economical onsite systems as an attractive alternative to expensive centralized sewer systems.

The industry's failure to provide an adequate approach for the maintenance of the most basic conventional systems has also contributed to the reluctance of states to embrace the more sophisticated onsite technologies. Aerobic treatment units are a case in point. The primary restriction on the acceptance of aerobic treatment units has been the problem of assuring long term maintenance of the system beyond the two years required under NSF Standard 40 certification. Aerobic manufacturers are reluctant to voluntarily increase their required service commitment of two years. They feel it puts them at a cost disadvantage with conventional and other onsite technologies which in most states do not have any enforceable service component.

If periodic monitoring and maintenance is needed for aerobic systems, it is certainly a need for all onsite systems whether it is the more complicated recirculating sand filter or simple conventional systems that usually only require periodic inspection and removal of septage. Although servicing of conventional systems is very straightforward and some would say down right simple, it is also critical in avoiding system failure.

This concern for maintenance management of conventional systems is voiced in seminar after seminar with repeated calls for educating the homeowner about the needs of the system. Simply writing code that says a conventional system should be inspected and serviced every three to five years is not likely to result in the homeowner, who probably doesn't even know the code exists, having the system serviced. Most homeowners have many priorities in their lives other than pumping their septic tank.

When does the homeowner have the system serviced? In seminar after seminar I have conducted, regulators and industry agree, "They have it serviced when it backs up."

Managing the homeowner is the key to managing maintenance! Now, how do we manage the homeowner?

Homeowners actually do three things that compound the problem of system performance and interfere with system maintenance management. First, they put things in the tank that don't belong. Second, they hydraulically overload the system. And third, as we said previously they perform system maintenance only when the system backs up.

Depending on the homeowner to act either takes direct regulatory enforcement, which states have been reluctant to do, or depends on homeowner education - an impossibly expensive undertaking that is unlikely to dramatically change homeowner attitudes.

The answer is to manage system maintenance by requiring wastewater filters in all systems utilizing septic tanks as part of the design. Requiring wastewater filters on the outlet of septic tanks manages the homeowner!

If the homeowner discards inappropriate material in the tank, the filter keeps it in the tank. Sanitary products, hair and cigarette butts will also be contained in the tank. If bleach or some other caustic material is discarded, the filter will not remove the offending agent. However, it will protect the field from the excess solids until the tank recovers. If grease is put in the tank, the filter will keep most of the grease out of the field.

If the homeowner overloads the hydraulic flow, not allowing the normal 24 hour retention time, the filter protects the field from solids carryover exacerbated by the flow.

Finally, if the homeowner has maintenance performed only when the system backs up, the filter will protect the field and slow the system down which assures system maintenance before there is a system failure.

Does this mean the system works fine one day and plugs the next causing a messy problem for the homeowner? No! All Zabel filters are designed with a bypass when the body of the filter plugs.

Does the bypass allow unfiltered material to leave the tank? No! The material rises over the outside of the filter, approximately four inches above the outlet invert, causing a gentle slowing of the waste system. The effluent exits through the normal outlet after it has been filtered through the clean reserve portion of the filter.

During the period the system has slowed, the homeowner has ample opportunity and warning to have the system serviced.

Do wastewater filters solve all the maintenance management problems of onsite systems? No. It is in systems utilizing conventional septic tanks and filtered pump vaults that most benefit from this process.

Wastewater filters do not solve problems of poor siting or poor design. They cannot correct problems caused by poor installation. When the system has been correctly designed and installed, however, the filter is the only passive system that will assure system maintenance prior to an expensive and catastrophic failure caused by overloading of suspended solids.

It will take states time to put in place the programs and training necessary to provide adequate monitoring and management of onsite wastewater system design and installation as well as systems maintenance. However, by simply requiring an inexpensive wastewater filter in every septic tank, conventional onsite systems will no longer be dependent on the homeowner's education or interest in the system's maintenance.

At a lower cost per system than any other design, installation or maintenance management program, requiring a wastewater filter in every septic tank will manage the homeowner assuring septic system maintenance in a timely manner. With conventional system maintenance assured, perhaps state regulators would be more likely to see onsite systems as an attractive and low cost alternative to expensive centralized systems. ✎

ZEUS™

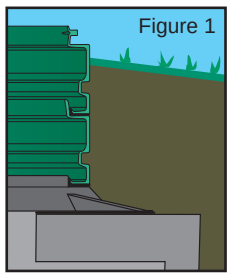
ZABEL™ ENGINEERED UNIFIED SYSTEM

An Integrated Approach to Onsite Systems...

By Theo B. Terry, III, RS

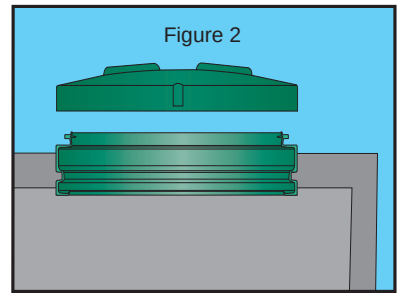
ZEUS™ is a new product line developed by Zabel™, but more importantly, it is a new way to approach the onsite wastewater market. To better understand that, let's take a look at the name ZEUS™. ZEUS™ is an acronym that stands for Zabel™ Engineered Unified Systems. Now, what does Zabel™ Engineered Unified Systems mean? Simple really! It means products that are either manufactured by Zabel™ or are manufactured to Zabel™ specifications and are designed (engineered) to make complete (unified) systems.

Now, let's take a look at the complete ZEUS™ line of products.

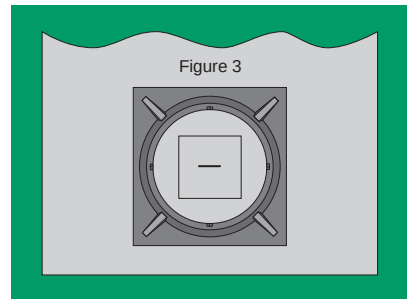


Let's start with Zabel's™ new access system. It is made up of a series of risers and lids. They come in two external diameters (20" and 26") and various heights. There is a 2" adapter for retrofitting an existing tank, a 6" adapter form for casting into the septic tank lid, and 6", 12 " and 38" risers. These risers are designed to lock together (as shown in figure 1) to form a watertight sealand along with the new lid, a tamper resistant seal.

The 20" diameter access system is designed to provide at-grade access to septic tanks for routine service of the effluent filter and/or tank. The 26" diameter access system is also designed to provide at-grade access to septic tanks for routine service but more specifically, it is designed to work with Zabel's™ series of filter pump vaults (FPVs). The 6" adapter is designed to be cast into the lid of a concrete septic tank and, with its 16" diameter opening, allow



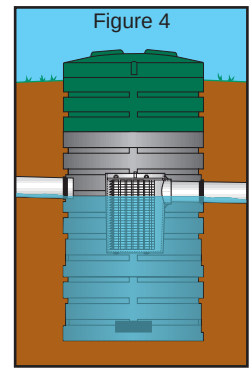
one of the three hanging FPVs to be easily installed (see figure 2). In cases of retrofit, the 2" adapter can be utilized (as shown in figure 3) to provide at-grade access to a FPV installed into and along with the new lid, a tamper resistant seal.



The ZEUS™ access system is also used in conjunction with our new basin system.

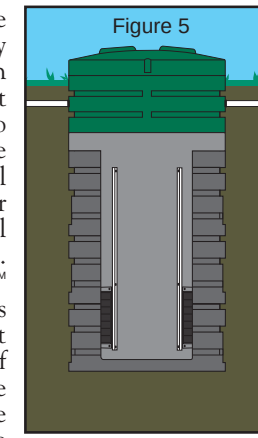
The basins are available in two different series, a 20" diameter series and 26" diameter series.

Each series is available in two different models with a height of 12 and 38 inches. These basins have a variety of uses. The 12" version of each series can be used as distribution boxes or as



water level control boxes for constructed wetland systems.

The 38" tall basins can be utilized several ways. It is an economical means of retrofitting an onsite system with an effluent filter where access to the septic tank is not possible (as shown in figure 4). It may also be used to house a pump for a recirculating sand filter. And, the 26" diameter and 38" height basin is designed to work with our newest FPV, the interlocking 36 model (see figure 5).



I have already briefly touched on FPVs, but now let's go into a little more detail about their special features. Zabel™ manufactures four different models of FPVs. Three of these models are designed to hang suspended through the access opening in a septic tank. The fourth is designed to interlock with Zabel's™ 26" diameter and 38" tall basin, as mentioned earlier.

The hanging 34 model is designed to be suspended over the access opening by using appropriate lengths of 1-1/2" PVC pipe to bridge the opening. The hanging 36 and 44 models are also designed for this method as well as being hung inside Zabel's™ 6" tank adapter (as shown in figure 6).

All four of the FPVs utilize 1/16" level of filtration. The hanging 34 accomplishes this by way of a series of filter plates installed in the bottom of the vault. The other three models have filter plates installed on removable

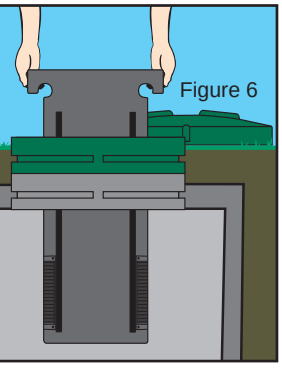


Figure 6

panels in the sides of the vault. These removable panels allow you to service the filter plates without having to disturb the pump and/or float switches (see figure 7). This is a real timesaver for service personnel and it eliminates the possibility of the pump and switches being improperly set during maintenance visits.

The FPVs have had turbulence testing performed by the University of Kentucky to determine the maximum acceptable dosing in gallons per minute. The hanging 36 and 44 can deliver a dose of 90 GPM without creating significant turbulence within the septic tank. The hanging 34 can deliver a dose of 35 GPM without creating turbulence.

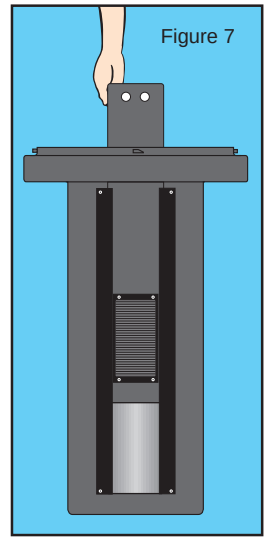


Figure 7

If you are using an FPV, then you are also using a pump. The FPVs have been designed to work equally well with an effluent or high head well pump. In the case of the effluent pump, it can be placed inside the vault, supported by its own legs. The high head well pumps require additional support and Zabel™ has built this into the FPV's design. There is a molded flange in the bottom of the vault (see figure 8). This is engineered to house the 4" Schedule 40 PVC pipe that acts as a flow inducer for the pump.

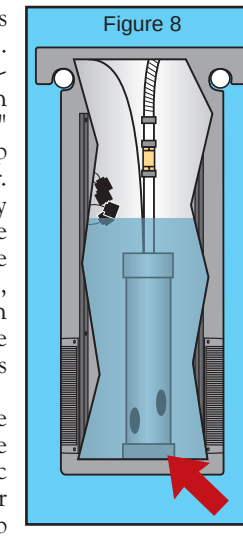


Figure 8

The flow inducer is part of the 1-1/4" discharge system for the high head well pump system. The 1-1/2" discharge system for the effluent pump does not require the 4" flow inducer. This and the size are the only differences between the two discharge systems. The rest of the discharge system consists of Sch 40 PVC pipe, flexible PVC pipe, and a true union ball valve. The systems also have check valves and anti-siphon valves available as options.

Last, but certainly not least, are the alarm and control packages. The ZEUS™ alarms come in two basic types: Indoor and Outdoor. Higher on the evolution chain of pump controls, we find control panels. Typical components of a control panel include: motor contactor, pump circuit breaker, HOA (hands-off-automatic) switch, control and alarm fuses and alarm package (beacon and horn). Typical options used in control panels include: alarm auxiliary contacts (for activating auto-dialers), event (cycle) counters (monitor the number of times a pump is started) and ETM (elapsed time meters, which monitor how long the pump runs).

There you have it. ZEUS™: Zabel™ Engineered Unified Systems, consisting of access risers and lids, basins, FPVs, discharge systems and alarm and control panels. All have been designed to work together to meet your onsite wastewater needs.

Installing Filters in Difficult Places

There are several techniques for achieving a successful installation in problem situations. Most of these situations can be handled successfully by using the following techniques.

Retrofitting Zabel™ Filters:
Any Zabel™ Filter can be retrofitted to existing onsite wastewater applications. The first method is to uncover the existing tank at the outlet end, remove the access lid and insert an A1800 Cartridge in the existing outlet tee or replace the existing outlet tee with the appropriate Zabel™ Filter. *(Figure 1)*

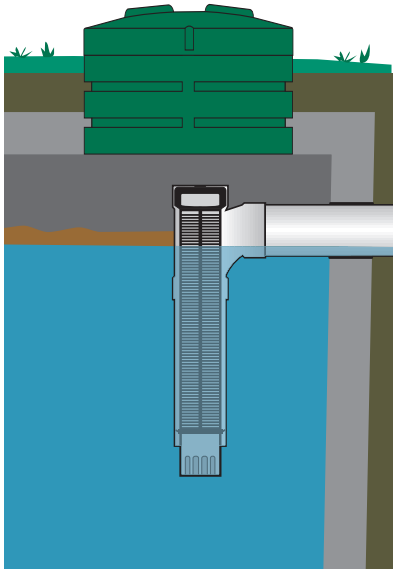


Figure 1

Where this is not practical, a Zabel™ Filter can be retrofitted using a Zeus™ Basin or Container Assembly. The tight line between the septic tank and the disposal field can be cut to allow for the installation of a Basin or Container Assembly. *(Figure 2)* The Zeus™ Basin system allows you to utilize the various risers in the Zeus™ Access system to bring at grade entry to the tank to allow for service of the filter. The Container Assembly includes everything you need - Filter Container, Adjustable Riser, Riser Lid, Lid Screws, Schedule 35 & Schedule 41 Pipe Seals and Sealant.

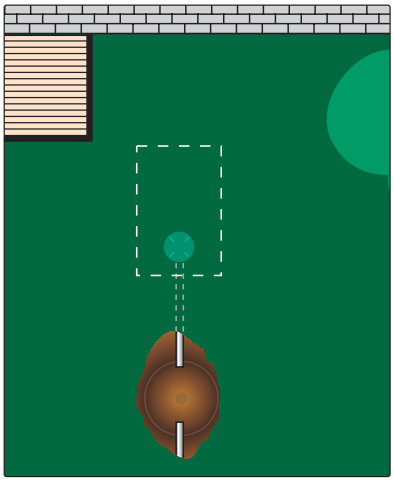


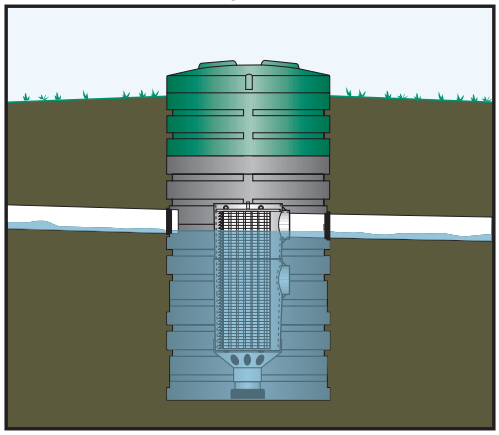
Figure 2

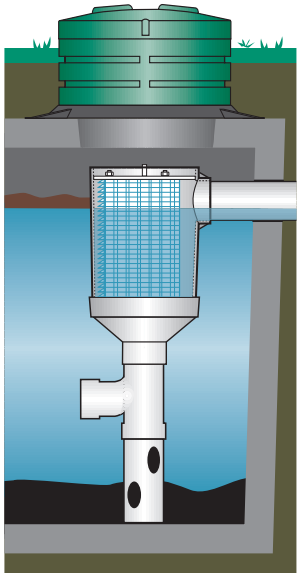
The 38" Basin will also allow you to install an A-100 HIP or A-300 HIP filter outside the septic tank. This is accomplished by using the Zabel™ 4" extension adapter and a section of 4" Sch 40 pipe extended to the bottom of the basin. 1" holes will need to be drilled into the extension adapter to allow solids to slough back into the basin. *(Figure 3)*

Supplementary Support Method for Installing Zabel™ Filters:
Installing two or more Zabel™ Filters in one tank, 18 inches or more from the end of the tank or in high strength waste applications such as restaurants or dog kennels sometimes requires additional support to handle the weight of the filter. Supplementary support can be achieved by following these directions.

Solvent weld the reducer to the bottom of the filter case. Using two pieces of Schedule 40 pipe

Figure 3





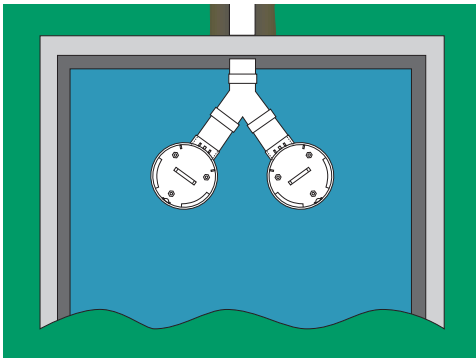


Figure 4

with an inverted Sanitary Tee located at the clear zone level, extend to the bottom of the tank for support. Make sure the pipe exiting the filter and extending through the tank wall is level. Cut four or more two inch holes in the PVC pipe below the Sanitary Tee to prevent sludge build up in the pipe. *(Figure 4)*

When installing an A-100 HIP or A-300 HIP unit in a tank use the Supplementary Support Method outlined previously above as well as a section of 4" Sch 40 PVC pipe extending from the lower filter case outlet to the tank end wall. This gives maximum support to this larger filter unit. *(Figure 5)*

A plumbing flange should be used where Schedule 40 pipe can not be extended through the tank end wall. *(Figure 6)*

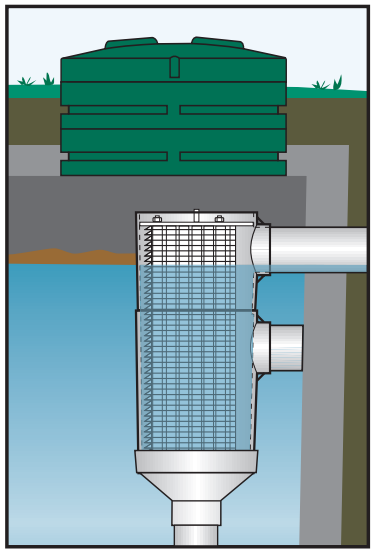


Figure 5

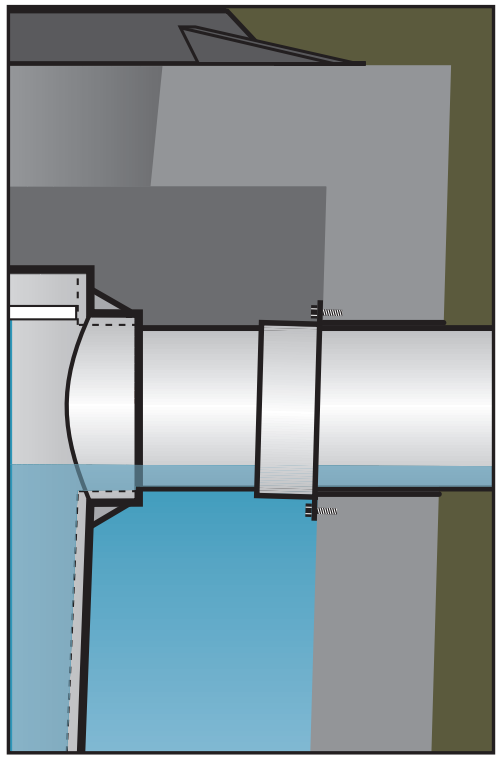


Figure 6

TESTING the WATERS

By Kevin Greene, BS, RS

You may ask what I am referring to with the title "Testing the Waters". The answer to this question comes in two parts. The first is our implementation of a research program. Research will allow Zabel™ to monitor the performance of existing products as well as assist in the development and design of future products.

The second part of the answer may not be as obvious as the first, however, it is just as important. It involves all areas of the industry working together toward the goal of protecting our nation's groundwater. Zabel™ has been working hand in hand with Phillips Brothers Construction, Isham Concrete Products, Registered Sanitarians and a number of helpful homeowners to create a neighborhood for knowledge.

This was accomplished by installation of the multiple flow measured sampling assembly throughout a single neighborhood. This will allow our technician to take multiple samples over a period of time according to the desired testing parameters.

These sites were carefully selected according to the size of the home and the number of residents.

This small neighborhood in a rural county of Kentucky will lend the secrets needed to improve our nations groundwater!

Instead of placing sample assemblies in previously occupied homes, we selected new homes. This will allow our technicians to monitor the tank from the beginning stages to full maturity. The data, in turn, will not only show filter performance, but also show the dynamics of the septic tank as it progresses to a state of equilibrium. This information will prove invaluable to Zabel™ in its efforts to design future products that protect our nation's groundwater.

Contact Kevin Greene, Zabel™ Environmental Technology, 1-800-221-5742, for more information on this program.

"Rebel Humor"

General Sherman was conferring with some of his officers as they camped near Stone Mountain, Georgia, when a Rebel soldier appeared on top of the mountain, screaming at them and waving a battle flag. He immediately dispatched one of the officers to go "take care of that Rebel."

The officer and the Rebel disappeared behind the mountain but fifteen minutes later, the Rebel was back, screaming and ranting. An angry General Sherman ordered the next officer to take five men with him to "get rid of that crazy Rebel."

Again, the Rebel and Yankee disappeared behind the mountain, but a mere thirty minutes later, the Rebel was back. A now irate General Sherman called for his best officer, Metalak of Minnesota, and ordered him to take one hundred of his finest troops to "get the Rebel or not come back. "

An hour later, Private Otis of Wisconsin, one of the troops who'd gone with Lieutenant Metalak, appeared. He was dirty, battered and bleeding from every pore. He had just enough strength left to make his report. "General, Sherman, Sir," he said, "it was a damn Rebel trick. There's two of them."

Zabel Filter Test Reports

TEST REPORTS

Most university, government and independent testing laboratories report TSS and BOD as an average of the data points taken before and after filtration. Zabel has also developed a new device for taking a control sample as well as a filtered sample at the same time in order to directly compare and report the results as an average percentage of reduction. Both methods are based on a technique for comparing filtered and non-filtered effluent from the same septic source.

Reporting TSS from a filtered source without comparing an unfiltered sample from the same source tells nothing about the actual contribution the filter made to the performance of the system. For example, you can report an average TSS of 30ppm, but without knowing what the TSS was before the filter was installed you can't tell whether the filter performed well or not.

Because of the way others have reported their filter's "performance", Zabel has always reported our filters performance including the benefit of the septic tank itself. If the tank removed 31% of the TSS and Zabel's filter improved this by 68%, the total system - tank and filter - were removing 98% of the total solids.

Consistent with university, government and independent testing laboratories we will continue to report the filtered versus unfiltered effluent from the same site as a percentage of improvement, but we will only report the actual improvement achieved by the filter ignoring the performance of the tank. We recommend our competitors do the same so it will be easier for the industry to compare results.

Keep this in mind when you compare the following test results with our competitors or with our previous reporting method.

Data Point Averages	TSS **Before**	TSS **After**	% Reduced	BOD$_5$ **Before**	BOD$_5$ **After**	% Reduced
Zabel A100						
TN Tech University	95.7	45.8	52.1	131.3	89.3	31.9
Kentucky Testing Laboratory	93.2	31.0	66.7			
Zabel A300						
Wastewater Services[1]	6530	113	98.3	2130	780	63.4
Zabel A1800						
DNREC, Div. of Water Resources	190.5	68.0	64.3			
Zabel Proprietary Test Program	131.6	56.6	56.9			

1. The grease & oils for this installation were: Before - 1764 After - 2.2 % Reduced - 99.8

In addition to the data shown above, Zabel received a report on five restaurants monitored by the Merrillville Conservancy District. This report was done by ranges and is shown below.

Zabel A300	**Range mg/l Without Filter**	**Range mg/l With Filter**	**% Reduction**	
			Low End	**High End**
Kentucky Fried Chicken	120 to 6500	50 to 110	53.3	98.3
New Moon Chinese	76 to 1300	34 to 120	55.3	90.8
Cisco's Mexican	96 to 1040	19 to 110	80.2	89.4
Gary Country Club	130 to 706	22 to 94	83.1	86.7
Patio Restaurant	70 to 800	50 to 120	28.6	85.0

Managing Grease Through Filtration

By Richard W. Lowhorn, Ph.D

Restaurant discharges into public sewers and onsite treatment systems have been a problem for many years. Currently, it is an even greater problem with the ever-increasing number of full-service and fast food restaurants being built across the country. These restaurants typically discharge large amounts of suspended solids (SS) and oil & grease (O&G) which reduces the capacity of public sewers and destroys the ability of onsite systems to treat and dispose of wastewater over time.

The traditional treatment for this waste prior to discharge is a grease-trap that separates the floatable and settleable materials. The discharge from a grease-trap comes from the clear-zone created by the separation process. Even though it is called a clear-zone, the water here usually includes a considerable amount of SS and O&G.

Recently, the application of grease-trap effluent filters was evaluated as a possible addition to the treatment of this clear-zone waste. A study performed in Sydney, Australia, on a 40-seat caf indicated that the discharge from the restaurant cooking area had an average suspended solids and oil & grease of 3,024 and 3,630 mg/L, respectively. Using a grease-trap effluent filter (A300 produced by Zabel™ Environmental Technology) to improve treatment, the average suspended solids was reduced to 84 mg/L and the average effluent O & G to 78 mg/L[1]. The combination of the grease-trap and the effluent filter resulted in an average 78% reduction in SS and 84% reduction in O&G. Another study performed in Australia concluded that the effect of this same grease-trap effluent filter was a reduction in the SS of 61% and O&G of 63%.

These studies indicated the need for improved treatment of grease-trap effluents and also suggested that an effluent filter may be an inexpensive option for the treatment. Zabel™ Environmental Technology contacted Tennessee Technological University to produce additional non-biased data on the effect of the Zabel™ A300 grease-trap effluent filter unit. Four full service restaurants in Cookeville, Tennessee, were selected for the study.

Each of the four restaurants had their grease-traps retrofitted with a Zabel™ A300 filter installed using the maximum support method (See figure 1). These grease-traps varied in design from single compartment tanks all the way up to three compartment tanks and tank capacity of 1000 to 5400 gallons.

Two samples were taken from the grease-traps each day, one sample from the clear-zone at the inlet to the filter base (influent) and one sample at the outlet from the top of the filter unit (effluent). During the week, a composite of the samples for each site was prepared. These composite samples were used for the Total Suspended Solids (TSS) and the Oil & Grease (O&G) analysis. Sampling started on May 12, 1997, and ended on July 6, 1997.

Although there was tremendous variability as it relates to grease-trap design and size, the A300 consistently reduced the levels of SS and O&G contained in the effluent. The reduction in SS ranged from 26.8% to 56.7% and the reductions in O&G from 43.5% to 51.7%.

Future studies are planned to determine the specific mechanisms causing these reductions as they relate to grease-trap design.

Editor's note: For a copy of the entire study conducted by Tennessee Tech, contact Zabel™ Environmental Technology.

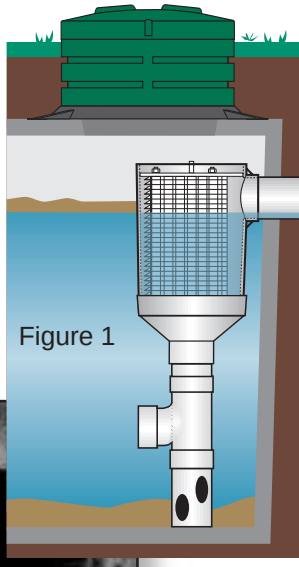
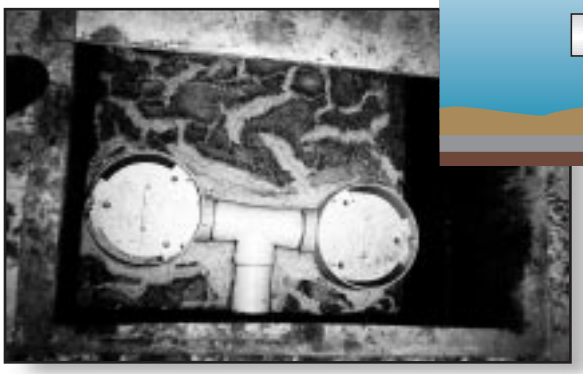


Figure 1



Zabel Filter Residential Maintenance

The interval for servicing septic tanks is set by state and local code. Throughout the United States there is a wide divergence of opinion on what this interval ought to be, but most regulatory agencies suggest two to five years. The filter does not increase the frequency of servicing for a properly operating tank.

To service the filter, remove the tank cover located over the filter. Pump the tank prior to removing the disc dam cartridge for cleaning to prevent any solids from escaping to the field when the cartridge is removed.

Pull sharply on the lid handle and the disc dam cartridge will slide out of the case. In order to prevent contamination of the ground with septage, turn the cartridge sideways and lay it back in the opening. Now rinse off the cartridge with a garden hose or a fresh water tank hose from the truck being careful to rinse all septage material back into the tank. It is not necessary that the filter be cleaned "spotless". The biomass growing on the filter aids in the pretreatment process and should be left on the discs.

On rare occasion it will be necessary to dismantle the cartridge. If required, remove the nuts on the three bolts at the top of the lid and the cartridge can be easily disassembled for cleaning. After the cartridge is cleaned, and reassembled if necessary, place it back in the filter case. Be sure it is all the way in the case until it snaps into place. Replace the septic tank cover.

Easy to maintain • Ecologically Sound

- The filter is virtually self cleaning. The continued action of the anaerobic organisms on the filter discs causes lodged particles to disintegrate and fall to the bottom of the tank.

- The filter only requires servicing at the normal inspection and pumping intervals required of a standard septic installation.

- The filter cartridge is safely hosed off back into the tank by a qualified septic tank pumper.

ZABEL environmental technology

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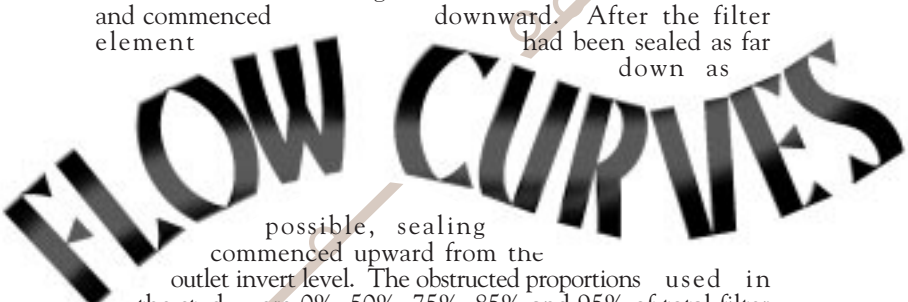
Call Zabel at 1-800-221-5742 for further information.

Flow Curves as They Relate To Degrees of Filter Maturity

The primary objective of this study was to define relationships between head (height of water above the outlet invert of a septic tank) and associated flow rates for all the Zabel™ filters based on different stages of maturity (obstruction). The secondary objective of this work was to mathematically assess how a float switch placed inside the new Zabel™ Smart Filter™ (1800 HIP) would react to surge conditions at various stages of maturity.

The procedure used to test the filters was to induce flow into the septic tank and determine the respective associated heads of water relative to the outlet invert. The process was repeated for each of the filters at 0, 50, 75, 85 and 95% maturity level. The results provide a set of curves that can be used for each filter to define the relationship between head and flow rates for a given degree of maturity.

For the 1800 and 1800 HIP filters, the flow rates used were 5.5, 8.4, 11.2, 14.0 and 16.7 gal/min. For the A100, A100 HIP, A300 and A300 HIP filters, flow rates of 16.7, 27.2, 45.8 and 64.1 gal/min were used. After recording head values for each flow, the filter cartridge was removed, and a portion of the cartridge was sealed off to prevent that portion from transmitting flow to the outlet. Blockage started level with the outlet invert and commenced downward. After the filter element had been sealed as far down as possible, sealing commenced upward from the outlet invert level. The obstructed proportions used in the study were 0%, 50%, 75%, 85% and 95% of total filter area. Following the blockage of the appropriate proportion of the filter area, new heads were determined for the flow rates using the procedures mentioned earlier.



The findings from the first objective of this study enabled calculation of the flow rates corresponding to various heads at various stages of filter maturity. When coupled with the dimensions of a standard septic tank, the level of filter maturity necessary to activate the Smart Filter™ alarm could be obtained.

There was no performance loss of any filter tested until simulated maturity levels exceeded 75% of the total filter area. At 77% maturity level for example, there is 100 gallons storage below the inlet invert. Thus, at the 77% maturity level it would take an instantaneous load of 100 gallons to activate the Smart Filter™ alarm. This 100 gallons is the equivalent to a typical washing machine (with a heavy load) and two bathtubs being emptied into the tank simultaneously and instantaneously (Corbitt, 1990). Even under such severe conditions, the alarm would activate only for a very short period before the water level drained to below the inlet invert. At 94% maturity, the liquid in the tank would be at the level of the inlet invert, and the alarm would be activated on a basically continuous basis.

Dwayne Edwards, Ph.D

Bibliography
Corbitt, R.A. 1990. Standard handbook of environmental engineering. McGraw-Hill Publishing Company, New York.

Editor's note: For a free copy of Dr Edward's report contact Zabel™ Environmental Technology.

Protect Your Home With An A1800 Zabel Filter!

These children are protected by a Zabel Filter.

Protects Your Family And Pets

A failing septic system can potentially expose your children and pets to untreated waste-a real health hazard.

Protects Property Value

Your home is the single largest investment you make. If your septic system fails, your property value decreases.

Saves You Money

Thousands of unprotected septic systems fail every year. A small investment in a Zabel Filter helps to protect your septic system from costly repair.

How Does The Zabel Filter Work?

The most common reason for failure of septic systems is excessive solids leaving the septic tank which then causes clogging of lateral lines and drainfields. With a Zabel Filter installed in your tank, solids are kept in the tank so they can be further broken down and kept out of your lateral lines.

Lifetime Guarantee

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A1800 Commercial & Residential

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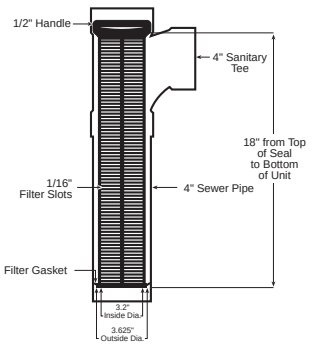
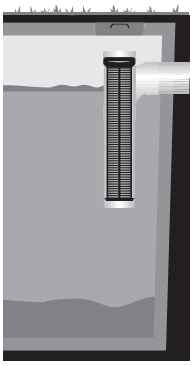
EASIER INSTALLATION:	fits any 4" outlet T and Pipe.
FLOW RATE:	800 GPD





U.S. Patent 5,382,357
5,482,621
Canadian Patent 2,135,937

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Zabel™ in the Delta

By Bill Rawlins

Delta Port Alabama is a small community on the Gulf of Mexico northwest of Dauphin Island. Its canals eventually discharge into the Gulf of Mexico through the West Fowl River and Portersville Bay. This directly affects a 25-acre oyster reef, which is closed periodically due to elevated numbers of fecal coliform.

The University of South Alabama, the Mobile County Health Dept. and Alabama Dept. of Public Health are working in support of the EPA's Gulf of Mexico program to restore the shellfish harvest by providing alternative system design and monitoring. The new systems will replace failed or failing systems that may be contributing to the high fecal coliform levels. The installation of the systems is a joint effort of the University of South Alabama, Mobile County Health Dept. and manufacturers such as Zabel™ Environmental Technology.

Bill Rawlins assembling the A-300 with reducer

Dr. Kevin White of the Civil Engineering Department at the university is supervising the design and installation of the systems. It is a three phase project, the first two being ten sites of constructed wetlands or intermittent sand filters. Phase three will consist of five drip irrigation systems with Zabel™ filters installed to protect them and risers to grade to provide access for inspection and testing. Not all of the systems in phase three have been completed due to inclement weather. The ones that have been installed have proven to be functioning very effectively.

Dr. Kevin White and two members of the Mobile County Health Department

This project is intended to demonstrate that elimination of pollution of human origin using alternative onsite sewage treatment technologies can result in an overall improvement in the Gulf's water quality as measured by fecal coliform levels.

SMART FILTER™

ALARMED FILTER SYSTEM

By Theo B. Terry, III, RS

THE EFFLUENT FILTER WITH A BRAIN...

In the past year, as I have traveled from the East Coast to the West and all points in between, I have heard a common theme from regulators. They say something like: "We believe in effluent filters as a means to protect the drainfield from excessive solids, but how do we go about educating the homeowner that these devices need to be serviced?" Well, Zabel™ has been working for the past year to develop a product that will do just that. Introducing the Smart Filter™, the filter with a brain!

At Zabel™, we have a saying, **"Manufacturers should respond to the needs of the industry rather than the industry responding to the needs of the manufacturer."** By following our own advice, we were able to respond to the needs of the industry and develop a product that truly fills a need- an effluent filter that tells the homeowner it needs servicing.

How did we come to this point? We started with a need for a way to insure that homeowners would maintain their septic systems. Effluent filters address this issue, as they force routine maintenance of septic systems. As the filter "matures", the plumbing fixtures are slower to drain, thus giving the homeowner a passive warning that the system needs to be serviced. But what if the homeowner fails to recognize this passive warning feature? The filter fully matures and the homeowner experiences what we like to refer to as the teachable moment. The disposal field has been protected from excessive solids and the problem is contained within the septic tank where it is manageable. Understandably, not all homeowners appreciate this teaching method!

Therefore, we set about the task of developing a product that would accomplish the same result in a way more acceptable to most homeowners. We began to look around and discovered that today we want our products to tell us they need servicing. Our cars tell us when to change the oil, our laptop computers tell us when the battery is low, so why shouldn't the effluent filter protecting our system tell us when it needs servicing?

U.S. Patent 5,683,577, 5,382,357, 5,482,621
Canadian Patent 2,135,937
Other Patents Pending

MADE IN USA

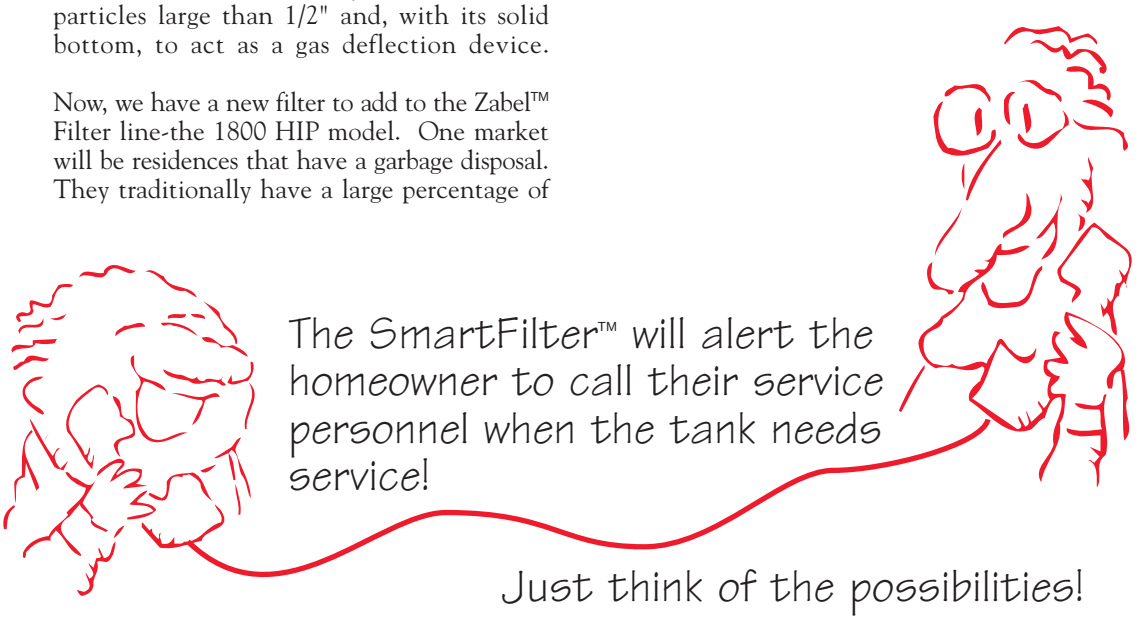
First, we had to redesign our filter to be able to accept a vertical switch. This was accomplished by redesigning the handle of the 1800 filter cartridge to accept the new vertical switch.

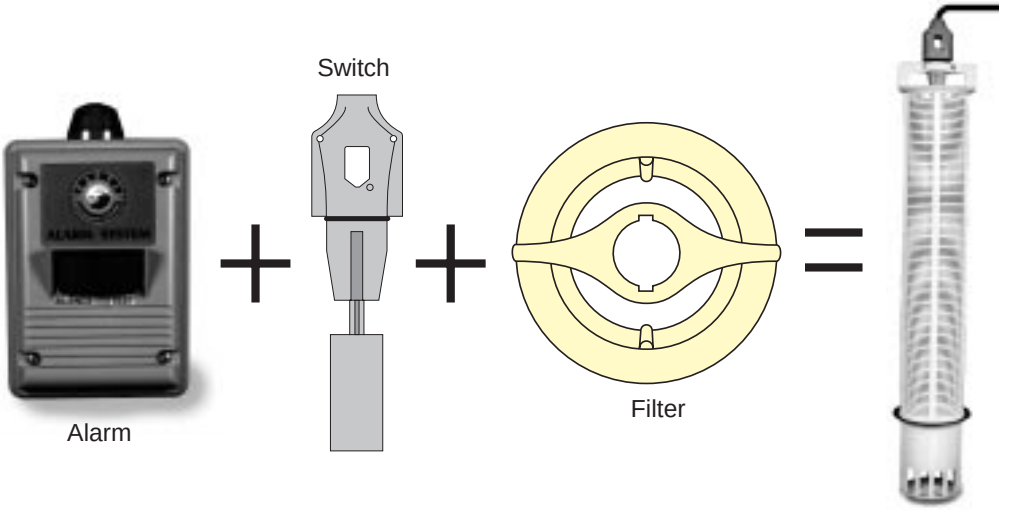
Once this was done, we needed to build in some added protection for the switch so that it would not give false alarms. Our concern was that large floatables in the septic tank would adhere to the switch and cause it to float, triggering a false alarm. To alleviate this problem, we designed an extension for the bottom of the 1800 filter cartridge. This extension gives us the ability to filter out gross particles large than 1/2" and, with its solid bottom, to act as a gas deflection device.

Now, we have a new filter to add to the Zabel™ Filter line-the 1800 HIP model. One market will be residences that have a garbage disposal. They traditionally have a large percentage of gross floatable particles as well as many fine, ground-up particles, which can rise on gas bubbles.

When you add the new vertical switch to the 1800 HIP, you now have **a filter with a brain**, a **SMARTFILTER™**. Simple, really. The manufacturer responding to the needs of the industry, rather than the industry responding to the needs of the manufacturer.

Editor's Note: See related article on filter flow curves by Dr. Dwayne Edwards in this issue.





Call Zabel™ **1-800-221-5742** for more information on this exciting new product or visit our web site http://www.***zabel***.com

Onsite Marketing - Tradition and Opportunity

ZABEL™ Announces New Pricing Policy

By Harry L. Nurse, Jr.

The traditional foundation of the wholesale plumbing distribution system is:

- Wholesalers that stock large quantities of products enabling them to sell to contractors at a competitive price, and
- Exclusive wholesaler-manufacturer distribution agreements where the manufacturer agrees not to sell any other wholesaler in a specific geographic market and the wholesaler agrees not to sell any competing manufacturer's brand.

Both wholesalers and manufacturers, to develop and protect 'their' market distribution, carefully guard these exclusive relationships. Woe to the manufacturer who breaks this unwritten rule and a plague on the house of a manufacturer who dares to sell direct to contractors.

Historically, outside of pumps and controls, the onsite market is one in which most wholesalers have shown little previous interest. The lack of wholesaler interest resulted in the onsite market developing its own unique direct distribution channels.

Now comes the surge in growth of the onsite market and traditional plumbing wholesalers are now interested in distributing onsite products in addition to the pumps and controls they have always carried.

But the onsite market is a completely different market. It adds three new factors to the traditional wholesale mix that muddy the traditional linear manufacturer - wholesaler - contractor - plumbing distribution network. These unique factors are:

- Concrete tank pre-casters acting as onsite wholesalers,
- Onsite plastic component manufacturers selling pre-casters & contractors, and
- Treatment systems manufacturers setting up exclusive distributor networks sometimes through contractors, pre-casters and occasionally wholesalers.

We have spent a great deal of time and effort studying this unique onsite market to determine the best way for ZABEL™ to sell and distribute products. We wanted a market strategy that would allow both the wholesaler to participate in the onsite market and to preserve our relationships with the contractors and pre-casters that have helped make ZABEL™ what it is today. ZABEL's™ goal is to encourage everyone- contractor, pumper, pre-caster and wholesaler- to participate in this rapidly growing onsite market not by setting up restrictive exclusive sales agreements, but by allowing everyone to participate.

To achieve this goal we have developed the following marketing policy for sales and distribution of ZABEL™ products.

We have created a Contractor/Pumper and a Wholesaler/Pre-caster pricing program resulting in two price lists - Contractor Price List and Wholesale Price List.

Both price lists give quantity discounts based on the number of units purchased, but wholesalers and pre-casters get an additional discount multiplier for ZABEL™ Filters & Accessories and for ZEUS™ Systems. If they choose, this enables the wholesaler/pre-caster to sell to contractor/pumpers at or near the ZABEL™ contractor price while enjoying an excellent profit. This also gives the contractor/pumper a choice of buying from his local wholesaler/pre-caster or buying direct from ZABEL™.

The Contractor Price List will offer the contractor/pumper the most value for the competitive dollar available, and the Wholesaler Price List will make it possible for the wholesaler/pre-caster to stock and sell ZABEL™ products at a competitive and profitable price.

The wholesaler/pre-caster will have the opportunity to stock and sell ZABEL™ onsite products to a market that has been created by ZABEL™, simply by deciding to stock our products. Any contractor/pumper placing an order with ZABEL™ will be told if there is a ZABEL™ product stocking wholesaler/pre-caster nearby so he may choose to buy locally or purchase direct from ZABEL™.

Rather than embracing an either/or strategy of direct sales or exclusive wholesale distribution, ZABEL™ will both continue direct sales to contractors and pumpers as well as provide a unique new opportunity for wholesalers and pre-casters to expand their sales in the onsite market.

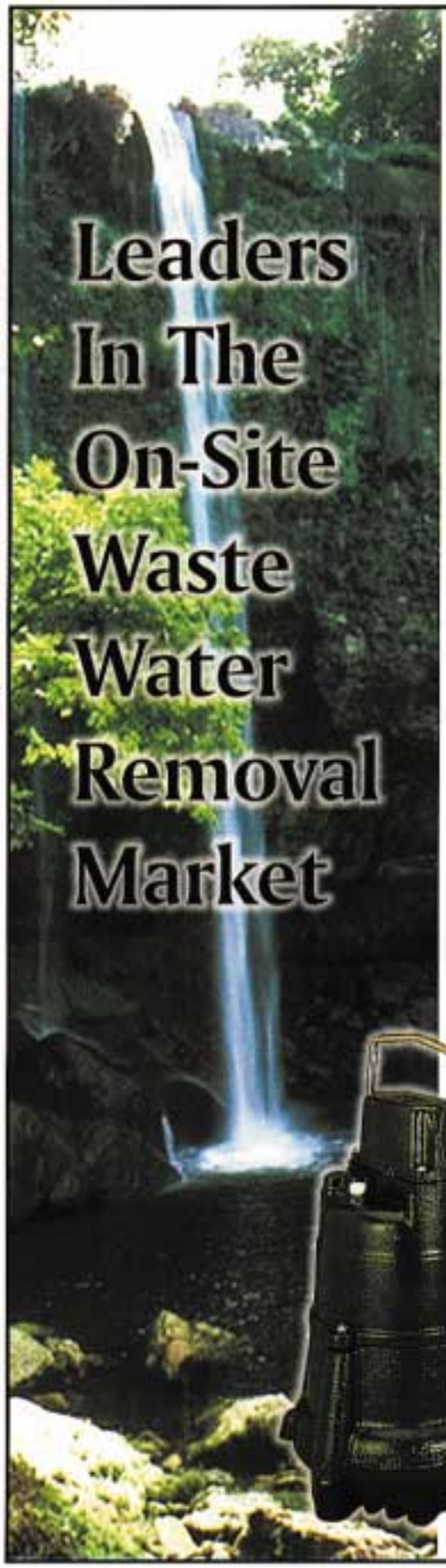
Once again ZABEL™ is the leader in onsite marketing - blending tradition with unlimited opportunity.

This is what the Lord says:

"Stand at the crossroads and look;
ask for the ancient paths,
ask where the good way is
and walk in it,

and you will find rest for your souls."

Jeremiah 6:16
New International Version



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Septic Tank Effluent Filters: Just a Physical Barrier or a Biological Treatment Process?

By: Gail M. Brion, Ph.D

As anyone familiar with the world of microorganisms knows, where there is habitat, there will be microorganisms. Bacteria colonize the interior surfaces of clean water pipes quickly, creating biofilms even in the presence of toxic chemicals and very low nutrient levels. So, it was no surprise to see healthy biofilms attached to A-100 filters. The question remained, however, if these "bugs" were helping or harming the performance of the filter. Preliminary results from field studies measuring the removal of solids and organics across A-100 filters in-situ at residential locations have indicated that there is more to the performance of these filters than just the physical treatment.

The Zabel™ A-100 effluent filter was initially designed to reduce the concentration of total suspended solids leaving septic tanks, particularly items such as cigarette butts and other items that could potentially clog leach fields. Previous research has shown that the A-100 unit not only removes a significant amount of solids (TSS), but also removes suspended and soluble organic material (BOD). However, is the BOD removal due to just filter impingement of suspended solids, or could the biofilm be reducing the load of solubilized organic material by bacterial assimilation? To answer this question, samples were taken at two very different septic systems and analyzed for Total Suspended Solids (TSS), Total BOD (TBOD), and Soluble BOD (SBOD). Samples were taken representative of flow influent and effluent from the filters at the two different sites. Site A was a typical septic tank. Site B was an old, overloaded septic tank that had collected soil from the surrounding area due to poor drainage. The results collected over the summer of 1997 from these sites suggest that the Zabel™ A-100 filter is actively removing BOD by both impingement and biofilm assimilation.

As other studies have found, the Zabel™ A-100 filter does hold back solids and in doing so reduces the amount of organic material leaving the septic tank. Preliminary results, presented in Table 1, show the average influent and effluent values found for the parameters measured at each site. Effluent concentrations of the parameters tested for were always on average lower than the influent concentrations. The trend here shows all parameters were reduced across the filter.

Table 1:

Average Values from Zabel A-100 Field Study

Site	TSS (mg/L)		TBOD (mg/L)		SBOD (mg/L)	
	Influent	Effluent	Influent	Effluent	Influent	Effluent
A	68.3	41.8	467	389	366	342
B	443.5	361.0	265	245	227	191

How much reduction do these numbers represent? Table 2 summarizes the reductions and presents the findings in terms of percent of analytes removed by the filter. Although the percent reductions are more modest than those reported by Zabel™ in the Spring/Summer '97 issue of the Zabel Zone™, bear in mind that the sampling protocol used for this field study was different than that of the prior studies. We wanted to measure the removal occurring across the 16-inch height and 1,857 square inch filter area, not the improved removal of the entire septic system by the addition of the filter.

Table 2:

Average Reductions from Zabel A-100 Field Study

Site	TSS (% reduction)	TBOD (% reduction)	SBOD (% reduction)
A	27.5	15.9	6.1
B	15.1	7.6	13.6

The removal of TBOD could be explained by physical removal of suspended material from the water, but removal of SBOD can ONLY be explained by bio-assimilation. Even in the heavily solids overloaded Site B septic tank, bacteria are removing SBOD from the water as it flows across the filter. The Zabel™ A-100 filter is helping septic systems improve the quality of septic tank effluent while preventing costly leach field plugging by functioning as both a physical and biological treatment process. To make the numbers more statistically significant, repeat studies are planned for the near future to confirm the trend. This research is key to developing future units and enhancing the service potential of existing A-100 type retrofits of septic tank systems.

Editor's note: For a copy of the entire study conducted by University of Kentucky, contact Zabel™ Environmental Technology.

Service

What A Great Idea!

By Bill Rawlins & Larry Nurse

Operation & Maintenance (O & M) is an issue that has come to the forefront of today's onsite community. It is a lack of maintenance that has been identified as the leading cause of onsite system failures. In addition, it is the reason most often cited for installing central sewers in areas that could utilize onsite systems. In fact, the only attribute that a central sewer system holds over an onsite system is the fact that a central sewer system has someone paid to oversee O & M.

Just think about it. Onsite systems have proven their ability to deliver a higher quality effluent into the environment than do their counterparts, central sewer systems. Then consider the high cost of operating and maintaining a central sewer system. First you have the monthly sewer fees, then the hidden costs that come in the form of local taxes collected to offset the cost of maintaining these sewer systems. These taxes could have gone for other services or here's a radical thought; even lowered.

So given all these reasons, why do onsite systems continue to have an image problem? The reason is quite simple really; there has not been any operation and maintenance plans setup for onsite systems. Typically, onsite system maintenance has been the system owner's responsibility. Homeowners tend to think about their septic system only when it fails. A statement commonly uttered by homeowners is, " I don't understand what happened to my system, I haven't done anything to it or had any problems for the last 20 years and all of the sudden it just starts failing." Well it didn't just fail overnight, the problem has developed over time due to the lack of routine maintenance.

So the logical solution for this problem is to have some qualified person perform routine maintenance on these septic systems to ensure their continued high quality treatment and disposal of wastewater at the point of origin. Because if properly maintained, onsite systems are permanent solutions to wastewater treatment rather than a temporary fix until central sewer comes along. Sounds simple, so what's the problem?

The problem is that most everyone in the onsite industry has taken too narrow a view of the role they play in the successful treatment and disposal of wastewater. They do not see themselves as being in the onsite wastewater treatment business. Instead they view themselves as being an installer; a person who installs or repairs systems, a pumper; a person who pumps tanks, etc. What is needed is for these folks to take a holistic approach to the onsite wastewater market. We need for them to view themselves as onsite wastewater professionals.

Onsite professionals specialize in onsite wastewater treatment and disposal and not just one particular aspect of the industry. They provide "cradle to the grave" type service. They install systems, service and maintain systems, repair and when necessary replace systems. In essence, they provide one stop shopping.

Does this mean that every installer has to go out and purchase an expensive pumper truck, or that every

pumper needs to purchase an expensive backhoe and dump truck in order to provide this broad range of services? The answer of course is no! What they do need to do is establish some strategic alliances with complimentary onsite professionals. For example: John Doe's Backhoe Service may form an alliance with Bob Smith's Pumper Service. Now without an increase in capital investment both companies have potentially doubled the range of services they can offer to their respective customers.

The next step is to develop an O & M Agreement that can be sold to the systems owner at the time of initial installation or when first serviced. The agreement specifies that the onsite system will receive an annual inspection and that routine service will be performed at the time of inspection. Let's take a look at each of the two main components of this agreement.

The inspection shall consist of such things as checking the structure of the septic tank, the condition of baffles or tees, the scum and sludge levels, and the operation of the disposal field. For alternative systems or for those systems involving a pump, the inspection process will be more elaborate, but this should give you a pretty good idea of what is needed to be included in the agreement.

The routine service shall consist of such things as cleaning the effluent filter, switching the alternating valve, and pumping the septic tank when needed (generally every 3 to 5 years). If the inspection reveals that the septic tank needs to be pumped more often than once every three years this would entail an additional charge. Again, as stated earlier, for alternative systems or for those systems involving a pump, there will be additional service needs.

So what does this mean for you the onsite wastewater professional? How does increased profits, more return business and better acceptance of your profession by the general public sound? If it sounds like what you are looking for then you have taken the first step to becoming an onsite wastewater professional. All you have to do now is work out the details of how the two companies share the fruits of their joint efforts.

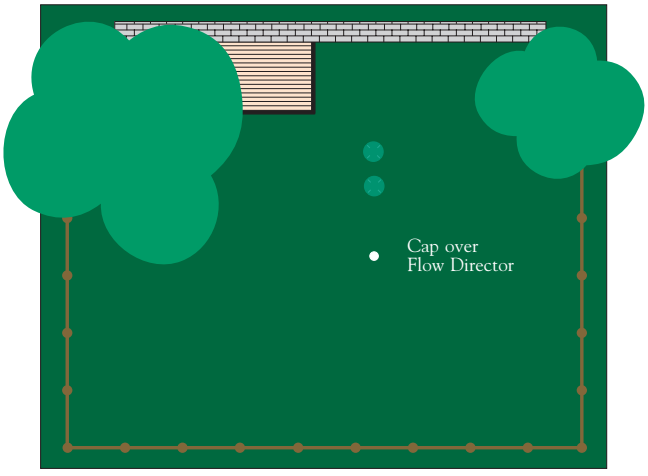
For example, John Doe's Backhoe Service has an O & M Agreement with John Smith the homeowner. During an annual inspection it was determined that the septic tank needs to be pumped. Mr. Doe had previously negotiated a price for this service from Bob Smith's Pumper Service and had already incorporated this cost into the price of his O & M Agreement. Thus, the homeowner benefits by having his system serviced, the installer gains additional revenue beyond the initial profits for installing the system and the pumper is guaranteed a service call.

Everyone comes out a winner. And the biggest winner of all? The onsite wastewater industry!

Best Insurance You Can Buy for Your Septic System

By Theo B. Terry, III, RS

There's an old saying-an ounce of prevention is worth a pound of cure, and for the homeowner putting in a sewage treatment system, this couldn't be truer. Planning for the future at the time the system is installed can save a great deal of aggravation and money, simply by installing a Zabel™ Filter and Flow Director.

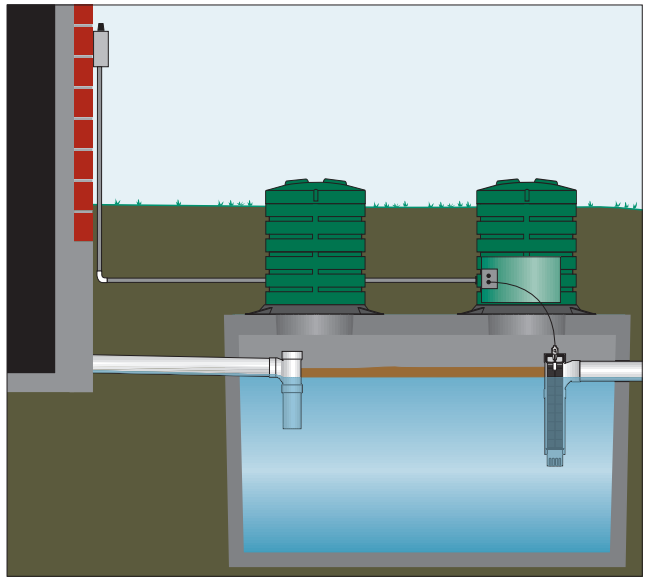


In order to understand the significance of this statement, it is important to consider the most common reasons for an onsite sewage system's failure. Although there are many reasons, most are caused by three basic things: lack of maintenance, hydraulic overload, or damage to the system. Let's consider each of these, one at a time.

1) Lack of system maintenance: When does the typical homeowner think about maintaining his septic system? Usually, when it's too late - there's either a backup into his home or a breakout in his yard. By then, the damage has already occurred. Most then have the tank serviced, hoping this will solve the problem. After repeated service calls, (and a great deal of unnecessary expense) the health department regulators are called in. And then what? The homeowner is told the system will have to be replaced. More expense, not to mention the inconvenience and mess of a landscaped lawn being sacrificed for the installation of a new system.

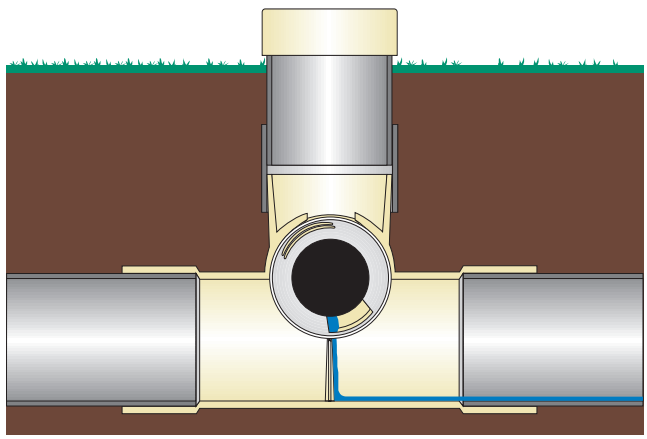
2) Hydraulic overload: The site may have a problem with a restricted soil horizon that is allowing a perched water table to infiltrate into the disposal field, thus overloading the system. The homeowner or builder may have diverted rainwater downspouts or other sources of surface water toward the disposal field. The system may actually be undersized, through a fault of design or construction, or due to a change in the average daily waste load. Even something as simple as a leaking plumbing fixture can cause the overload. Again, the answer for the homeowner is to have the tank serviced. And the cycle begins again-repeated service calls, more expense, and a cry for help from the regulators. In this instance, the answer is to resolve the source of the excess water by installing an interceptor drain, diverting surface water away from the field, or fixing the leaking plumbing fixture. Last but not least, is the installation of a wye valve, and adding more disposal field to carry the load so the initial field may recover. Again, more expense and the sacrificing of a landscaped lawn.

3) Damage to the system: The most common cause is through the fault of the homeowner, particularly in the form of "home improvements"-the construction of a new driveway, garage or above ground pool, not so intelligently located over the disposal field. And what about the landscaping I've mentioned so many times now? When that new tree or row of shrubs is planted without consideration for the placement of the system, trouble usually follows. In fact, homeowners can be quite ingenious at coming up with ways to destroy their septic systems with the end result generally being the replacement of all or part of that system.

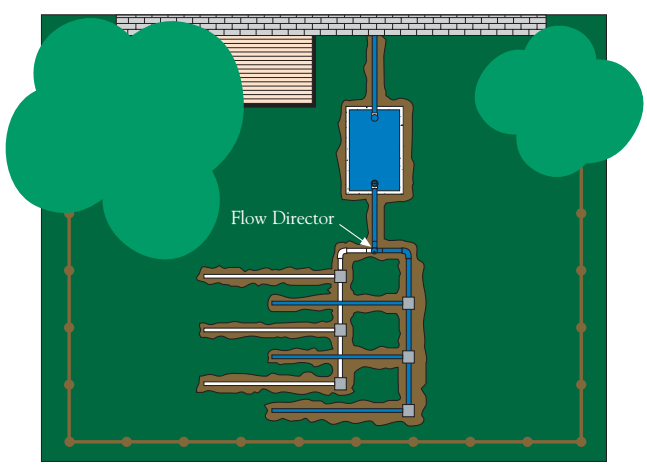


Do you see a pattern forming here? Homeowners are their own worst enemies when it comes to their onsite sewage disposal systems, but back to that "ounce of prevention." A little additional expense of adding the Zabel™ Filter and a Flow Director provides the insurance the homeowner needs against a failing system.

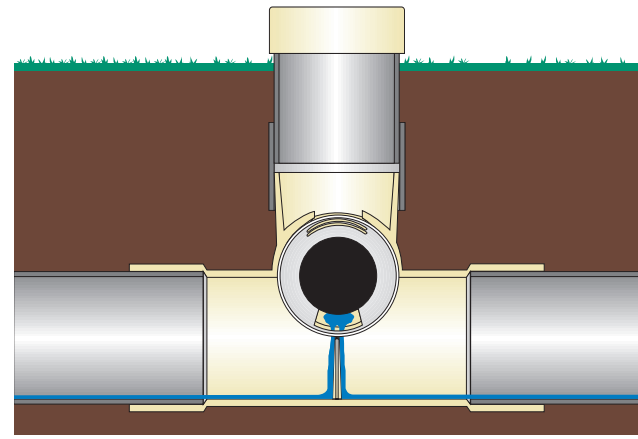
The Zabel™ Filter prevents solids from leaving the septic tank and therefore prevents the blockage of pore spaces within the soil structure that is vital in the disposal of onsite wastewater. At the point in time the filter matures, it alerts the homeowner to service the septic tank, prior to the destruction of the disposal field. With the new SmartFilter™ giving the homeowner a visible as well as audible alarm it's a foolproof safeguard. Even for the homeowner who generally doesn't like to consider his sewage disposal system until a problem develops.



While filters are generally accepted as a safeguard for the homeowner (in fact, many states and counties are moving to require filters as part of approved conventional disposal systems), Zabel™ also has a second type of "insurance" for the homeowner--the Z200-D Flow Director. This inexpensive device has the capacity to act as a wye valve, but more importantly, it has the versatility that a wye valve lacks.

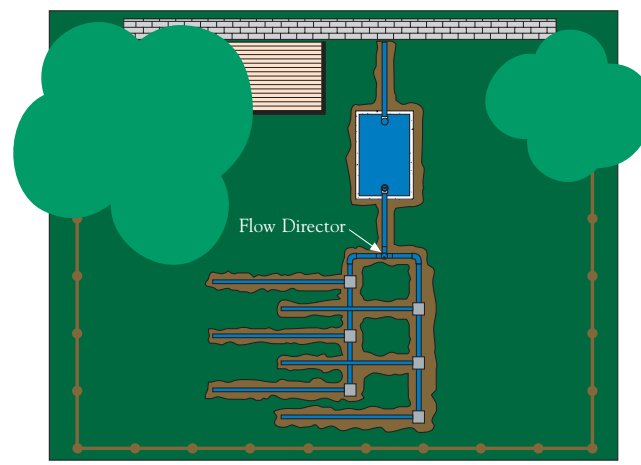


Where a wye valve directs flow to either field A or B, the Z200-D Flow Director has the capability to direct flow to either field A or B, or if needed, to both fields equally. Once again, this Flow Director is "homeowner-proof" on a level field, because if the homeowner fails to manually change the direction of the flow, the Z200-D will gravity back flow from the primary to the secondary field, reducing



the probability of an effluent breakout on that landscaped lawn.

Even the problem that occurs in many distribution boxes when the ground settles is avoided by the Z200-D, because the Z200-D keeps providing equal distribution due to its exclusive patented three-point support system. Studies by Dr. Bob Rueben, at North Carolina State University, show that the Z200-D delivers a relatively equal amount of flow, even when off-balance as much as a quarter-inch.



By installing a Zabel™ Filter in conjunction with a Z200-D Flow Director, solids are prevented from entering the field, homeowner maintenance is encouraged, and during those inevitable times of hydraulic overload, a built-in mechanism diverts flow to one-half of the field, allowing the first to recover. All this for less than the price of one wye valve.

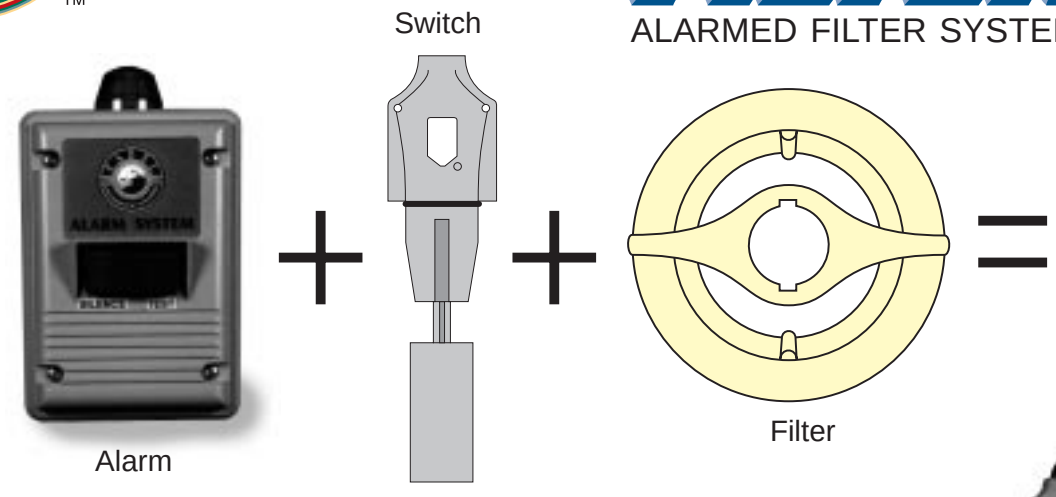
Simple, really. An ounce of prevention is worth a pound of cure.

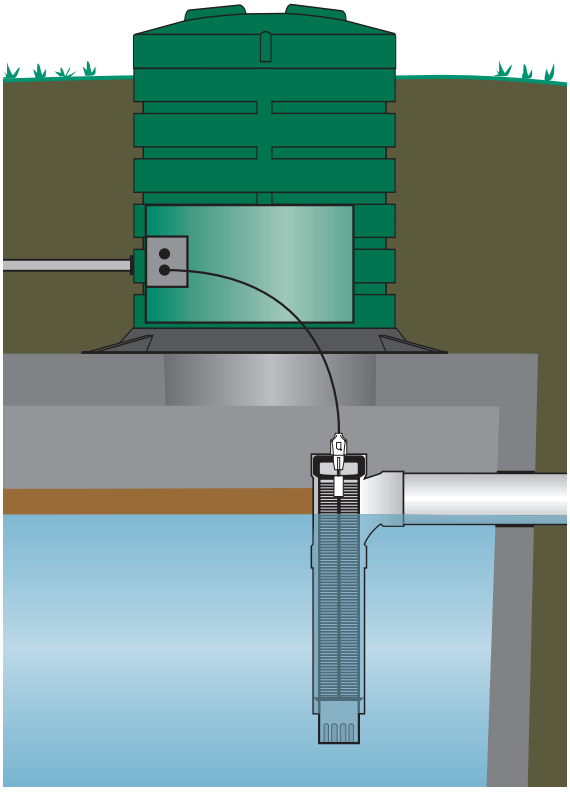
Editor's Note: Theo Terry is a former regulator from the state of Kentucky with twelve years of experience in the onsite wastewater disposal industry. He is the past President of the Kentucky Onsite Wastewater Association (KOWA) and is a current Board Member of NOWRA. When not working, Theo loves spending time with his family and coaching Peanut League Baseball.

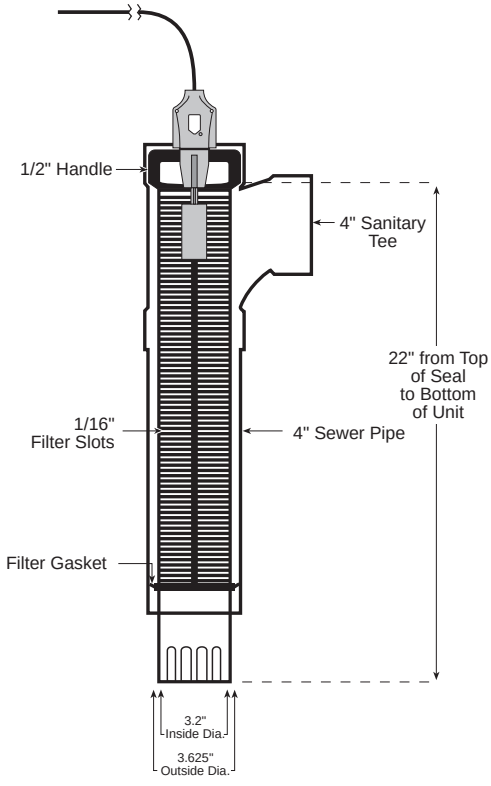
NEW!

SMART FILTER™

ALARMED FILTER SYSTEM







Zabel™ Recommendation: Any configuration of Risers used **should not** exceed 48" in height.

The product(s) shown are covered by one or more of the following patents:
U.S. 5,382,357, 5,482,621, 5,683,577, 5,580,453, 5,582,716, 5,591,331, 4,710,295, 5,593,584, U.S. Des. 386,241,349067, 4605501,5098568, Des. 309007, Canadian: 2,135,937 New Zealand: 264824, Other Patents Pending

NEW!

SMART FILTER™

ALARMED FILTER SYSTEM

Zabel's™ New Residential High Performance Filter is designed to provide extra protection for homes with garbage disposals and still sloughs the solids back into the tank.

A recent Zabel™ survey showed that 43% of homes on conventional onsite systems have a garbage disposal. Like most regulators, Zabel™ recommends homes on septic systems should not have garbage grinders - a condition that is prohibited by some codes and discouraged by regulators everywhere - but people do it anyway! Zabel's™ New Residential High Performance Filter has an exclusive two-stage filtration (1/2 inch & 1/16 inch) system designed to prevent large solids and fine garbage grinder floatables from getting inside the filter cartridge while maintaining Zabel's™ patented system for sloughing filtered solids back into the tank.

The **SmartFilter**™ is designed to improve the long-term performance of most onsite septic systems including those in homes using a garbage disposal and those in locations with poor soils. The system consists of an A1800-HIP-SF effluent filter, vertical float switch, and alarm panel.

The A1800-HIP effluent filter is designed to fit in a standard four inch outlet sanitary T pipe. This filter prevents unwanted solids from leaving the tank, entering the drainfield, and causing premature failure of the effluent treatment system. Over time, the filter collects solids which gradually restrict the flow of effluent to the drainfield.

The vertical float switch monitors the blockage of the filter and sends a signal to the alarm panel when the filter is approximately 90% full, or mature.

The alarm sounds and the red beacon illuminates prompting the homeowner to contact their installer or pumper for routine servicing.

During this routine service call, the installer or pumper should:

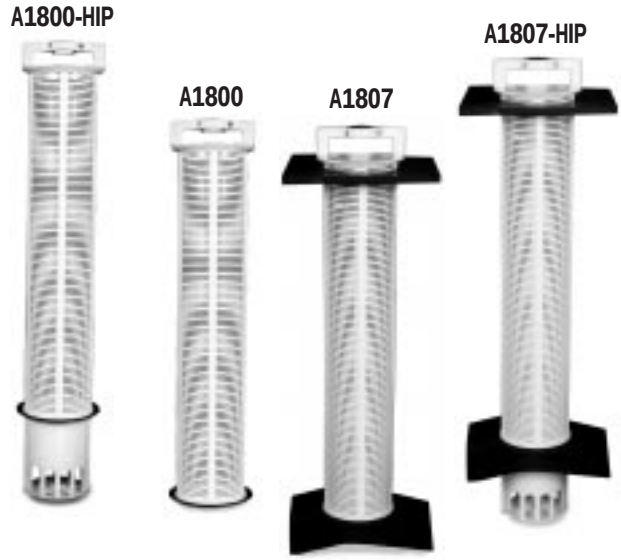
1. Clean the switch and filter. To avoid potential health hazards, the filter debris must be sprayed directly back into the septic tank and not onto the homeowner's lawn.
2. Determine if pumping is necessary by checking the depth of sludge in the tank.
3. Pump the tank if necessary.

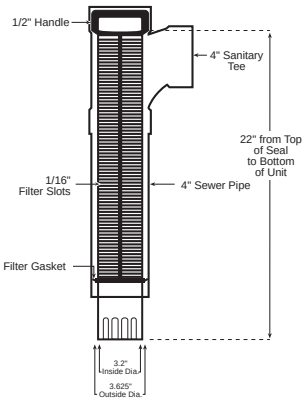
FEATURES

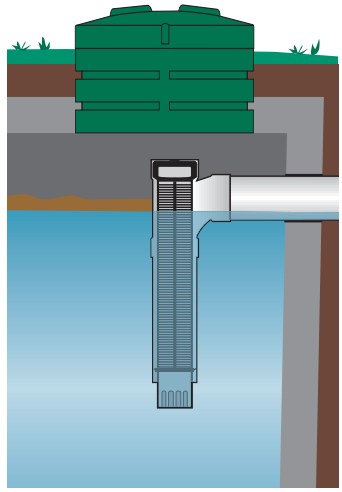
- Alarm panel features manual alarm test switch and horn silence switch
- Alarm horn sounds at 82 decibels at 10 feet (3 meters)
- Direct interface of control switch and Zabel A1800-HIP effluent filter insures proper placement of switch.
- Two-year limited warranty

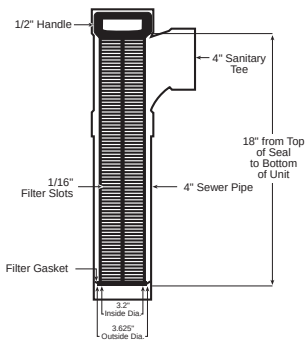
PRICES ON PAGE 59

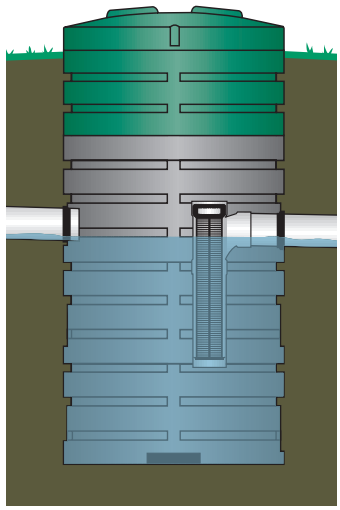
A1800s

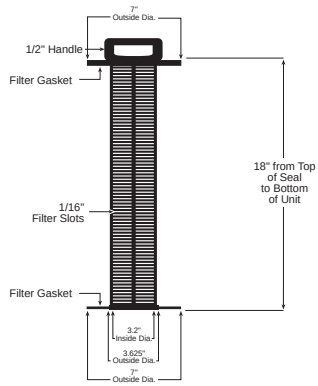


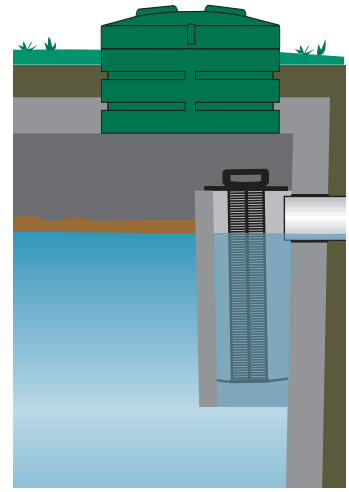












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Zabel™ A1800 Series Residential Wastewater Effluent Filter Product Specification

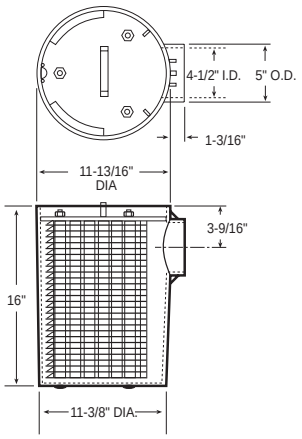
1. Product Name: Zabel™ The A1800 Residential Wastewater Filters, U.S. Patent Nos.: 5,382,357; 5,482,621; Canadian Patent No: 2,135,937; Other patents pending.
2. Model Numbers: A1800; A1800-HIP, A1800-HIP-SF, A1801, A1801-HIP, A1801-HIP-SF, A1807, A1807-HIP
3. Application: Single family homes no more than four bedrooms. **Zabel's™ New Residential High Performance Filter** is designed to provide extra protection for homes with garbage disposals and still sloughs the solids back into the tank.
4. Performance Specification
   4.1. All A1800 Models: Maximum daily flow - 800 gpd.
   4.2. Multiple Filters may be installed in manifolds to handle larger flows.
   4.3. TSS: Average reduction in TSS within 6 months of installation - 40 percent in typical residential wastewater.
5. Materials: All materials are non-corrosive PVC
6. New System Installation: Center the top of the 4-inch Filter Case under an outlet access opening at least 8 inches in diameter. Securely fasten the bell coupling of the case by a PVC solvent weld connection to the 4-inch PVC pipe extending through the outlet wall of the tank. The pipe extending through the end wall may be any schedule four-inch pipe. Location of the PVC outlet pipe in the tank end wall shall conform to local code. The PVC outlet pipe should extend at least 18 inches beyond the outside face of the tank wall. For septic tanks with cast in place concrete baffles use the A1807 model. Insert bottom of filter through thick gasket and slide to top of filter cartridge. Install filter cartridge with top gasket **only** into tank baffle, to ensure gasket lies flat without hanging over the edge of baffle. **Do not trim** gasket unless it overhangs edge of baffle. Remove filter cartridge and install thin gasket into the groove at the bottom of the cartridge. Reinsert the cartridge into the concrete baffle to complete installation. A riser to grade over the Outlet Access Opening is recommended.
7. Existing System Installation: The filter cartridge, Model A1801 may be installed in any existing 4" outlet Tee and pipe. The filter may be installed in an existing tank if an adequate outlet access opening already exists and the filter can be installed without damaging the existing tank. If a 4-inch PVC outlet pipe does not extend into the tank, the filter can be installed utilizing a plumbing flange. For septic tanks with cast in place concrete baffles use the A1807 model. Insert bottom of filter through thick gasket and slide to top of filter cartridge. Install filter cartridge with top gasket **only** into tank baffle, to ensure gasket lies flat without hanging over the edge of baffle. **Do not trim** gasket unless it overhangs edge of baffle. Remove filter cartridge and install thin gasket into the groove at the bottom of the cartridge. Reinsert the cartridge into the concrete baffle to complete installation. If the existing tank cannot be used, the filter can be installed in existing systems using a Zabel Container Assembly Model CA100 or Zeus™ Basin System.
8. Service: A professional onsite service company should perform all onsite system service.
9. Service Method: Grasp the filter handle and pull the filter cartridge upward. A Zabel™ 36" T-Handle is available if required to reach filters more than 12 inches below grade. Tap the cartridge on the inside of the inspection port or hose off the cartridge into the tank if needed and reinsert into the case. Installation of an effluent filter may increase the frequency of service if the homeowner discharges materials that are harmful to the system
10. Service Frequency: The filter should be cleaned when the septic tank is normally inspected and pumped as required by local regulation. The A1800's are designed to slough most normal solids off the inside of the vertical walls and back into the tank when the effluent flow is in a resting state. Installation of an effluent filter may increase the frequency of service if the homeowner discharges materials that are harmful to the system
11. Warranty: The A1800's are warranted to be free from defects in material and workmanship for the life of the original purchaser. Zabel's™ liability is limited to repair or replacement of the part and in no event shall Zabel™ be liable for any consequential damages of any kind.
12. Dimensions:

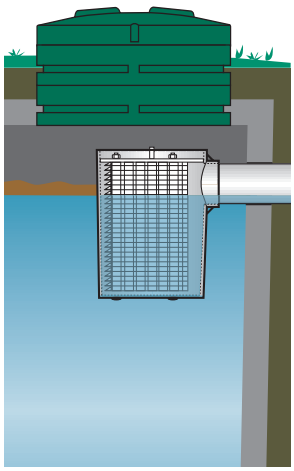
	Diameter	Cartridge Height	Filtration	Total Filter Surface	Lineal Feet of Weir
A1800	4"	18"	1/16"	158.4 in^2	61
A1800-HIP	4"	22"	1/2"-1/16"	*158.4 in^2	*61
A1807	4"	18"	1/16"	158.4 in^2	61

*Calculations are for the 1/16" area only.

PRICES ON PAGE 59

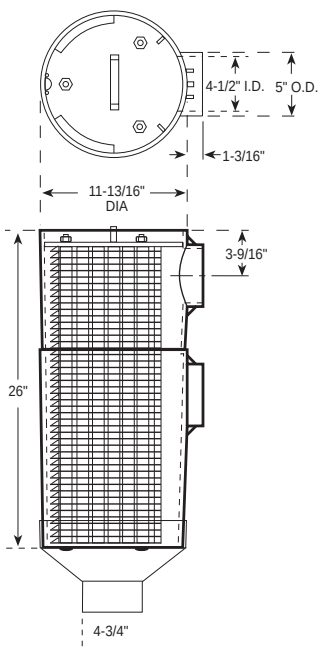
A100s

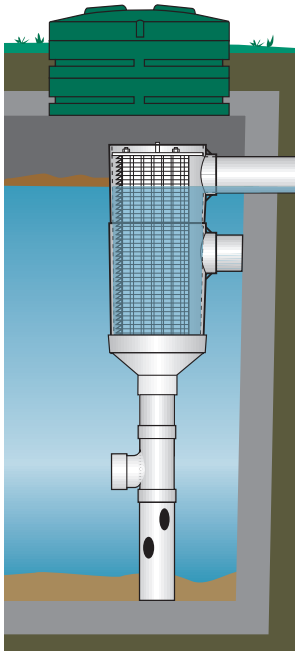


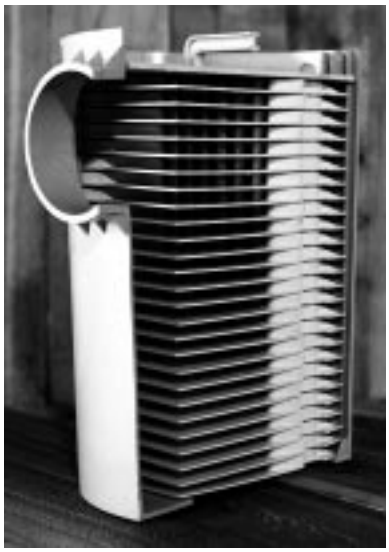


A100

A100-HIP







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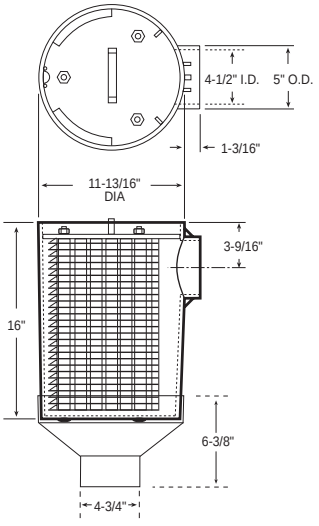
Zabel™ A100 Series
Commercial & Residential Effluent Filter
Product Specification

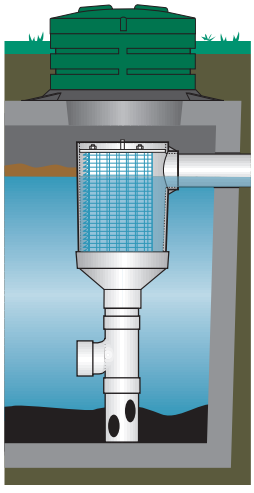
1. Product Name: Zabel™ A100 Commercial & Residential Effluent Filter, U.S. Patent: 4,710,295
2. Model Numbers: A100 Case & Cartridge; A101 Cartridge Only; A100-HIP Case & Cartridge; A101-HIP Cartridge Only
3. Applications: Apartments, trailer parks, schools, churches, shopping centers, and offices; Septic dump stations and community treatment plants; Single and Multi-family homes
4. Performance Specification
   - 4.1. Model A100: 3,000 gpd
   - 4.2. Model A100-HIP: 4,500 gpd
   - 4.3. Multiple filters may be installed in manifolds to handle larger flows. Use a Zabel Flow Control Plate Model FC100 to set the effluent flow to predetermined limits.
   - 4.4. TSS: Reductions in TSS within six months of installation - 50 to 90 percent. The higher the pre-filtered TSS the greater the percentage of reduction.
   - 4.5. $BOD_{5:}$ Reduction in BOD_5 within six months of installation - 20 to 45 percent is dependent on the make-up of the wastewater.
5. Materials: All materials are non-corrosive. Case & Lid - PVC; Filter discs - Polystyrene; Rods - Polyethylene; Nuts - Nylon. A100-HIP rods and nuts are stainless steel.
6. New System Installation: Center the top of the 12 inch Filter Case under an outlet access opening at least 16 inches in diameter. PVC solvent weld the bell coupling to the 4 inch Schedule 40 PVC exit pipe of the tank as required by local code. The PVC outlet pipe should extend at least 18 inches beyond the outside face of the tank wall. If required to meet depth requirements, install a Zabel™ Extension Reducer and 4-inch Schedule 40 pipe to the bottom of the filter case. A riser to grade is recommended. High performance double stack (Model A100-HIP) filters and multiple filters installed in manifolds will require additional support and access.
7. Existing System Installation: The filter may be installed in an existing septic tank if an outlet access opening already exists and the filter can be installed without damaging the existing tank. If a 4-inch Schedule 40 PVC pipe does not extend into the tank, the filter can be installed utilizing a plumbing flange. If the existing septic tank cannot be used, the filter can be installed using a Zabel™ Container Assembly Model CA100 or Zeus™ Basin System.
8. Service: A professional onsite service company should perform all onsite system service.
9. Service Method: Grasp the filter handle and pull the filter cartridge upward. A Zabel™ 36" T-Handle is available if required to reach filters more than 12 inches below grade. Hose off the cartridge into the tank and reinsert into the case. If required, the filter may be disassembled for further cleaning.
10. Service Frequency: The filter requires cleaning when the septic tank is normally inspected and pumped as required by local regulation. The A100s are designed to slough most normal solids off the inside of the vertical disc dam walls and back into the tank when the effluent flow is in a resting state. Installation of an effluent filter may increase the frequency of service if the homeowner discharges materials that are harmful to the system.
11. Warranty: The A100s are warranted to be free from defects in material and workmanship for the life of the original purchaser. Zabel's™ liability is limited to repair or replacement of the part and in no event shall Zabel™ be liable for any consequential damages of any kind.
12. Dimensions:

Model	*Diameter*	*Height*	*Filtration*	*Settling Area*	*Total Filter Surface*	*Lineal Feet of Weir*
A100	12"	16"	1/16"	596.16 in^2	1,857.6 in^2	198
A100-HIP	12"	26"	1/16"	1,018.08 in^2	2,908.8 in^2	297

PRICES ON PAGE 60

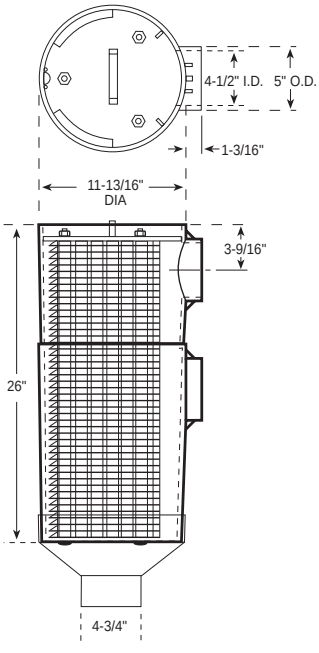
A300s

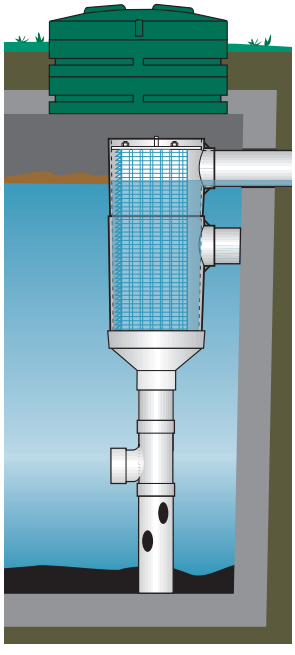




A300

A300-HIP





A300-ADA

Zabel™ Recommendation: Any configuration of Risers used **should not** exceed 48" in height.

The product(s) shown are covered by one or more of the following patents:
U.S. 5,382,357, 5,482,621, 5,683,577, 5,580,453, 5,582,716, 5,591,331, 4,710,295, 5,593,584, U.S. Des. 386,241,349067, 4605501,5098568, Des. 309007, Canadian: 2,135,937 New Zealand: 264824, Other Patents Pending

Zabel™ A300 Series High Strength Industrial & Commercial Effluent Filter Product Specification

1. Product Name: Zabel™ A300 Industrial & Commercial Wastewater Filter, U.S. Patent: 4,710,295
2. Model Numbers: A300 Case & Cartridge & Reducer; A301 Cartridge Only; A300-HIP Case & Cartridge & Reducer; A301-HIP Cartridge Only
3. Applications: Grease: restaurants; Hair: dog kennels, beauty shops, zoo facilities; Lint: Laundromats; Food processing: wineries, bakeries; Animal wastes: poultry, hog & cattle farms; Apartments, trailer parks, schools, churches, shopping centers, and offices; Septic dump stations and community treatment plants; Single and Multi-family homes
4. Performance Specification
   - 4.1. Model A300: Maximum daily flow - 3,000 gpd
   - 4.2. Model A300-HIP: Maximum daily flow - 4,500 gpd
   - 4.3. Multiple Filters may be installed in manifolds to handle larger flows than those shown above. A Zabel™ Flow Control Plate Model FC100 is available to set the effluent flow of a single filter to pre-determined limits.
   - 4.4. TSS: Reductions in TSS within six months of installation - 50 to 90 percent. The higher the unfiltered TSS, the greater the percentage of reduction.
   - 4.5. BOD_5: Reduction in BOD_5 within six months of installation - 20 to 45 percent is dependent on the make up of the wastewater.
5. Materials: All materials are non-corrosive. Case & Lid - PVC; Filter discs - Polystyrene; Rods - Polyethylene; Nuts - Nylon. A300-HIP rods and nuts-stainless steel.
6. New System Installation: Center the top of the 12 inch Filter Case under an outlet access opening at least 16 inches in diameter. PVC solvent weld the bell coupling to the 4 inch Schedule 40 PVC pipe of the tank as required by local code. Add 4 inch Schedule 40 pipe to the bottom of the reducer as needed. The PVC outlet pipe should extend at least 18 inches beyond the outside face of the tank wall. A riser to grade is recommended for all commercial and industrial installations. All filters installed in grease interceptor tanks **will require** additional support.
7. Existing System Installation: The filter may be installed in an existing tank if an outlet access opening already exists and the filter can be installed without damaging the existing tank. The filter can also be installed utilizing a plumbing flange. If the existing tank cannot be used, the filter can be installed in existing systems using a Zabel™ Container Assembly Model CA100 or ZEUS™ Basin System.
8. Service: A professional onsite service company should perform all onsite system service.
9. Service Method: Grasp the filter handle and pull the filter cartridge upward. A Zabel™ 36" T-Handle is available if required to reach filters below grade. The filter may be cleaned with a steam wand, chemical degreaser or disassembled for further cleaning.
10. Service Frequency: The A300s are designed to be installed in high strength waste applications. Each application will have to be monitored to determine proper service cycles. See article on "Restaurant Applications for Zabel™ Filters" for recommended guidelines in the Spring/Summer 97' issue.
11. Warranty: The A300s are warranted to be free from defects in material and workmanship for the life of the original purchaser. Zabel's™ liability is limited to repair or replacement of the part and in no event shall Zabel™ be liable for any consequential damages of any kind.

10. Dimensions:

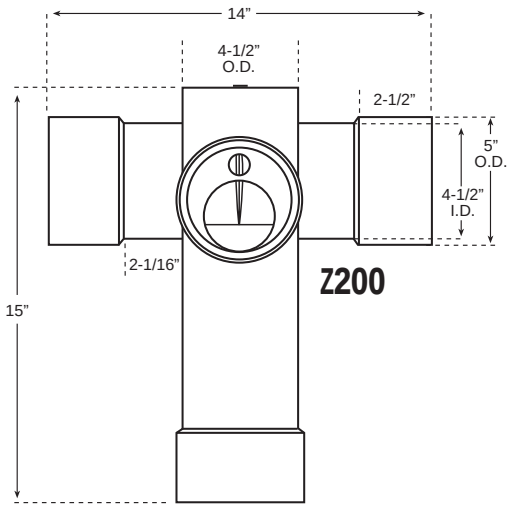
	Diameter	Height	Filtration	Settling Area	Total Filter Surface	Total Flow Area
A300	12"	18"	1/32"	624.69 in^2	1,857.6 in^2	206
A300-HIP	12"	28"	1/32"	1,067.04 in^2	2,908.8 in^2	312

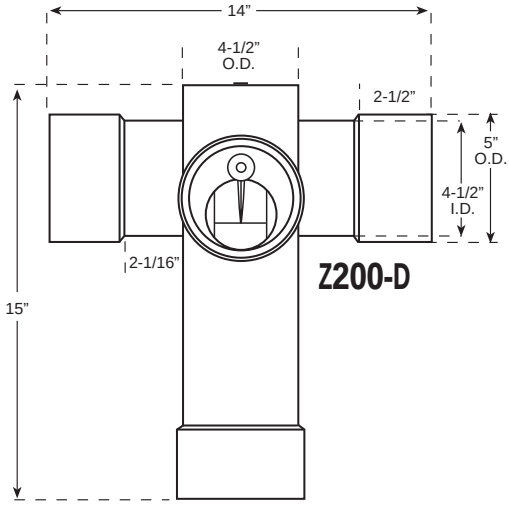
PRICES ON PAGE 60

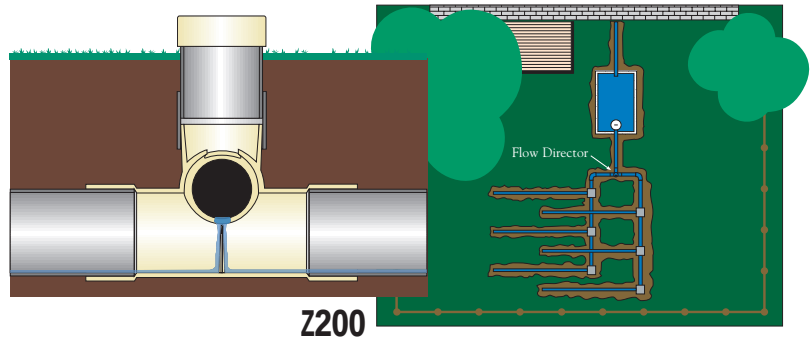
ZABEL environmental technology™

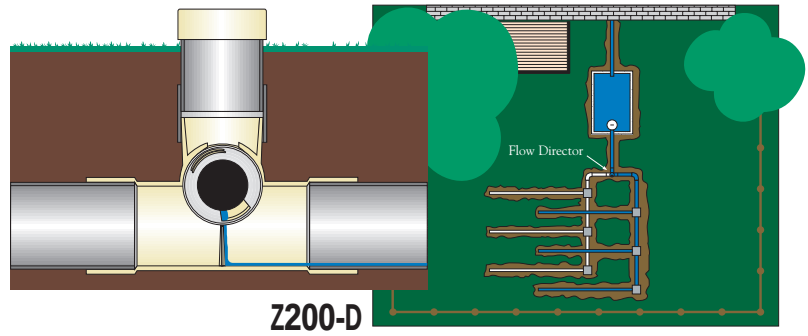
ZEUS™
ZABEL ENGINEERED UNIFIED SYSTEM

DISTRIBUTION SYSTEM









The product(s) shown are covered by one or more of the following patents:
U.S. 5,382,357, 5,482,621, 5,683,577, 5,580,453, 5,582,716, 5,591,331, 4,710,295, 5,593,584,
U.S. Des. 386,241,349067, 4605501,5098568, Des. 309007, Canadian: 2,135,937 New Zealand: 264824,
Other Patents Pending

Flow Divider - Flow Director
ZEUS™ Z200 - Z200D Series
Product Specification

1. Product Name: Zabel™ Flow Divider, Zabel™ Flow Director, US Patent Nos.: 4,605,501; 5,098,568 D309,007
2. Model Numbers: Divider Model Z200, Director Model Z200D
3. Application
   3.1. Divider Model Z200: Replaces old-fashioned distribution boxes and pipe manifolds.
   3.2. Director Model Z200D: Replaces expensive old-fashioned Y-valves.
4. Performance Specification
   Flow Pattern: Laboratory test results conducted by Dr. Bob Rubin Ed.D. on the Flow Divider using 1000 ml samples @ 3 gpm:

	Right Port Ave. Distribution	Left Port Ave. Distribution
Level	50.03%	49.97%
1/16” Tilt	50.2%	49.8%
1/8” Tilt	51.3%	48.7%

5. Materials: All material is non-corrosive Rigid Vinyl PVC
6. Installation: Weld the inlet side of the unit with PVC glue to the Schedule 40 pipe at the outlet end of the septic tank.
7. Service: A professional onsite service company should perform all onsite system service. Flow Divider: The Flow Divider does not require service, but may be used to view the effluent stream when the system is normally inspected.
   Flow Director: The Flow Director does not require service, but may be used to view the effluent stream when the system is normally inspected. If the flow needs to be adjusted between two lines or fields, turn the gear device in the top of the unit to direct the sleeve valve in the proper direction. Direction of effluent flow can be confirmed by visual inspection.
8. Warranty: The Z220 and Z200D are warranted to be free from defects in material and workmanship for two years from the date of original installation. Zabel’s liability is limited to repair or replacement of the part.

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Flow Divider Exclusive Features and Benefits

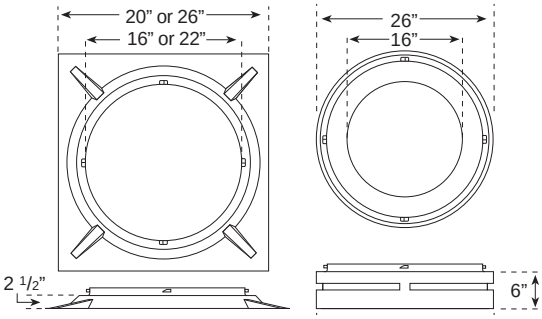
- Distributes effluent leaving the septic tank by means of a patented central weir design that insures flow is evenly divided even if the Flow Divider is not level.
- Distributes flow better than any distribution box or manifold.
- May be placed in manifold for even distribution of multiple lines.
- Allows effluent monitoring from grade level.

Flow Director Exclusive Features and Benefits

- The Flow Director is a Flow Divider with a patented sleeve valve installed to allow adjustment of the effluent flow between a primary and secondary field or between two or more lines.
- Replaces old fashioned WYE-Valves
- Allows effluent monitoring from grade level.
- The effluent will gravity back flow from the primary to secondary field if the homeowner fails to change the flow direction at the proper time reducing the probability of an effluent breakout.

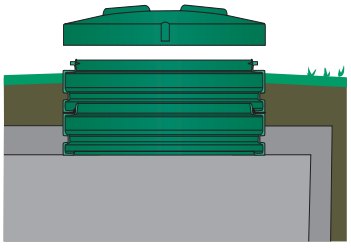
ZABEL ENGINEERED UNIFIED SYSTEM

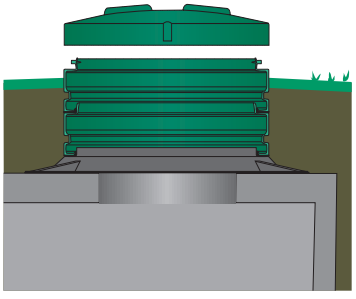
ZEUS™ ACCESS SYSTEMS



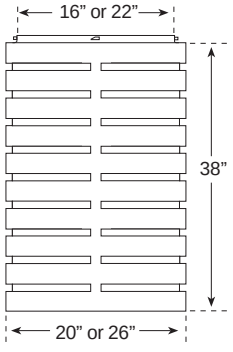
RB-TA-T-20x2
RB-TA-T-26x2

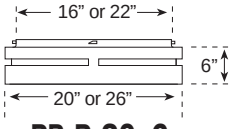
RB-TA-F-20x6
RB-TA-F-26x6



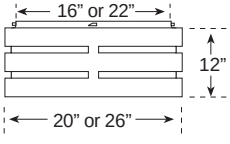


Patent Pending



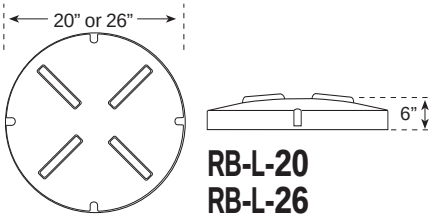


RB-R-20x6
RB-R-26x6



RB-R-20x38
RB-R-26x38

RB-R-20x12
RB-R-26x12



RB-L-20
RB-L-26

The ZEUS™ Access System includes six interchangeable parts: two septic tank adaptors, three risers and a lid. The patent pending interlocking system makes these Zabel™ products are resistant to unauthorized entry and provides protection from ground water infiltration.

The ZEUS™ Access System is designed to fit other ZEUS™ Systems such as: Filtered Pump Vaults, Pump and Discharge Systems, and Alarm and Control Systems to make complete STEP system packages. Look for the ZEUS™ trademark to ensure quality.

ZEUS™ Access Systems Product Specification

1. Product Name: ZEUS™ 20” or 26” Risers and Lids

2. Model Number:RB-TA-T-20x2, RB-TA-F-20x6, RB-R-20x6, RB-R-20x12, RB-R-20x38, RB-L-20, RB-TA-T-26x2, RB-TA-F-26x6, RB-R-26x6, RB-R-26x12, RB-R-26x38, RB-L-26

3. Applications: Appropriate for use in all access to septic tanks, dosing chambers and the ZEUS™ basin system.

4. Materials: All materials are non corrosive high density polyethylene.

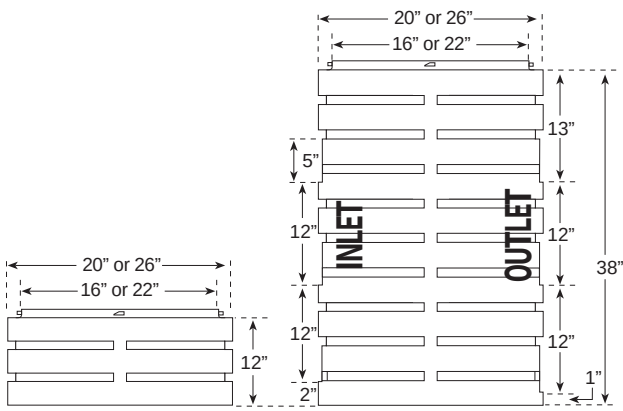
5. New System Installation: Cast either the 20" tank adapter form, Model # RB-TA-F-20x6 or the 26" tank adapter form, Model # RB-TA-F-26x6 into the concrete septic tank lid. To retrofit to existing tanks use 20" tank adapter top, Model #RB-TA-T-20x2 or the 26" tank adapter top, Model #RB-TA-T-20x2. First clean the concrete lid of any soil and debris around edge the of the inlet and outlet access opening. Apply double mastic to the bottom edge of the tank adapter top. Center the tank adapter top over the inlet and outlet access openings and walk down to seal the adapter to the top of concrete lid. Place a bead of sealant around the top inside edge of the tank adapter top and lower an appropriately sized riser into place. Turn the riser clockwise until it locks into place. Repeat this step as necessary until you reach the desired height for the access system. Zabel Recommendation: Any configuration of risers should not exceed 48" in height. Place the lid onto the last riser and turn clockwise until it locks into place. Secure in place with tamper resistant screws. Do not place any sealant onto the uppermost riser as this will inhibit access to the system for routine maintenance.

6. Warranty: The ZEUS™ access system are warranted to be free from defects in material and workmanship for two years from the date of original installation. Zabel’s™ liability is limited to replacement of the ZEUS™ access system only and in no event shall Zabel™ be liable for any consequential damages of any kind.

PRICES ON PAGE 61

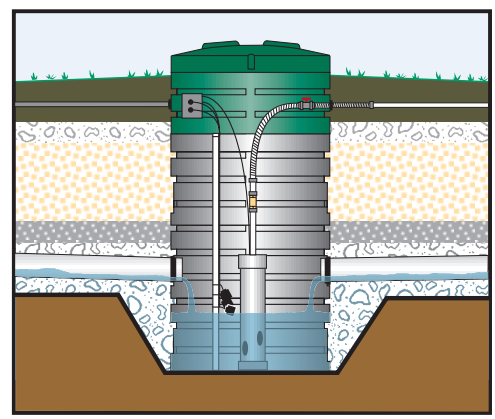
ZEUS™
ZABEL ENGINEERED UNIFIED SYSTEM

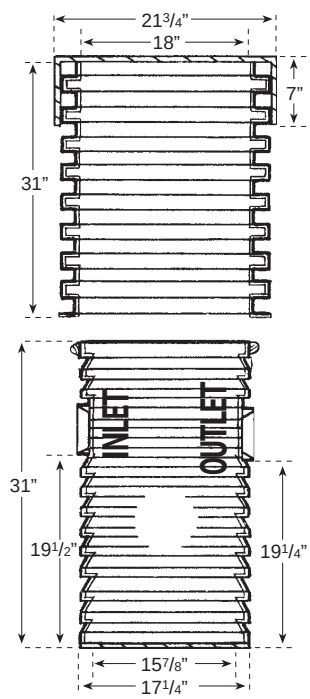
BASIN SYSTEMS



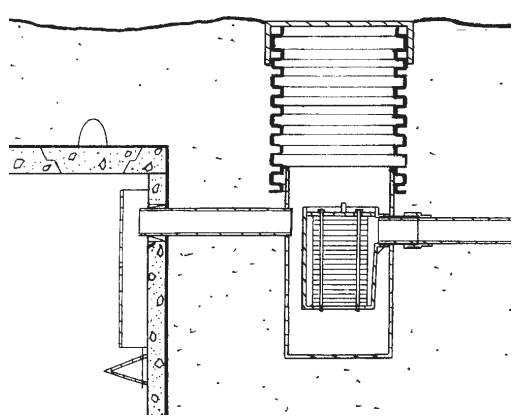
RB-B-20x12
RB-B-26x12

RB-B-20x38
RB-B-26x38





CA100



The ZEUS™ Basin System includes two basic designs: the first of which would be the container assembly, which acts as a economical means to house either the A-1800 or A-100 Zabel™ filters. The second design is the patent pending interlocking basin system. These basins are designed to work with the ZEUS™ Access System to make products that are resistant to unauthorized entry and provides protection from ground water infiltration. The ZEUS™ Basin System is designed to fit other Zabel™ products such as: Effluent filters, Interlocking Filtered Pump Vaults, Pump and Discharge Systems to make complete ZEUS™ packages.
Look for the ZEUS™ trademark to ensure quality.

ZEUS™ Basin Systems Product Specification

1. Product Name: ZEUS™ 20” or 26” Basins and Container Assembly

2. Model Number: RB-B-20x12, RB-B-20x38, RB-B-26x12, RB-B-26x38, CA100

3. Applications: Appropriate for use with all Zabel™ filters, as a distribution box water level control box for constructed wetlands and in the case of the RB-B-26x38 may be used to house the interlocking Filtered Pump Vault model number FPV-I36-2. May also be used to house a pump and discharge system for various applications, such as use within a recirculating sand filter.

4. Materials: All materials are non corrosive high density polyethylene.

5. Installation in new or existing systems: The Container Assembly includes everything you need to install the unit — filter container, adjustable riser, riser lid, lid screws, Sch 35 & Sch 40 pipe seals and sealant. The basins are designed to be custom fitted by the installer utilizing any one of the three pre-determined inlets or outlets on the 38” basins and the appropriate sized pipe grommets. The installer can customize the 12” basin as the need arises. The Zeus Access System can then be utilized to provide a grade access to these systems.

   Zabel Recommendation: Any configuration of risers used should not exceed 48” in height.

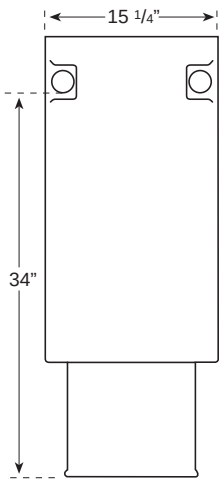
6. Warranty: The ZEUS™ Basin system are warranted to be free from defects in material and workmanship for two years from the date of original installation. Zabel’s™ liability is limited to replacement of the ZEUS™ access system only and in no event shall Zabel™ be liable for any consequential damages of any kind.

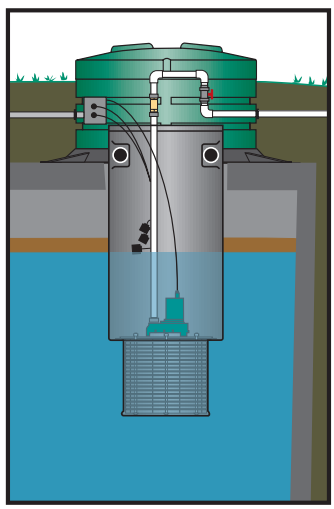
PRICES ON PAGE 61

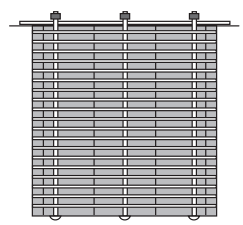
ZABEL environmental technology™

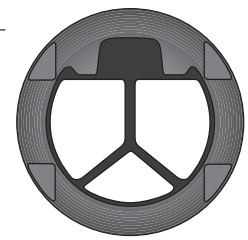
ZEUS™
ZABEL ENGINEERED UNIFIED SYSTEM

FILTERED PUMP VAULTS









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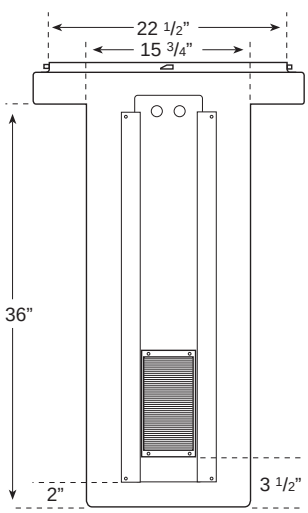
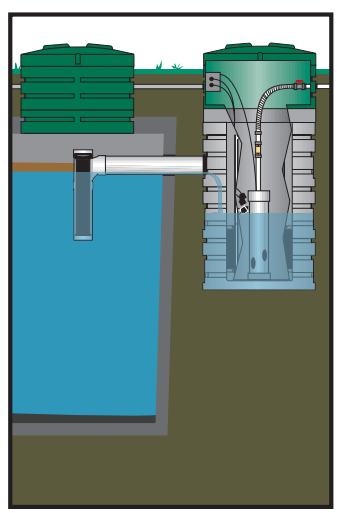
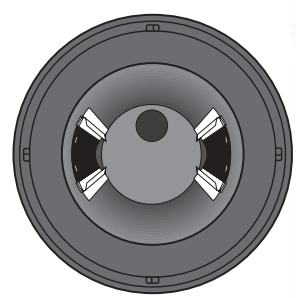






FPV-I-36-2

The ZEUS™ Filtered Pump Vault System includes seven pump vaults of two basic styles: Hanging style and Interlocked. The Hanging style pump vaults come in two filter designs: A100 and A1800 style slotted plates. The Interlocked FPV comes only with the A1800 style slotted plates. These parts are designed to fit those from the ZEUS™ Riser & Basin System, Discharge System and Alarm & Control System to make complete STEP System Packages.

Zabel™ Recommendation: Any configuration of Risers used **should not** exceed 48" in height.

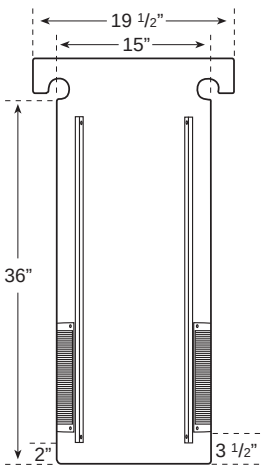
The product(s) shown are covered by one or more of the following patents:

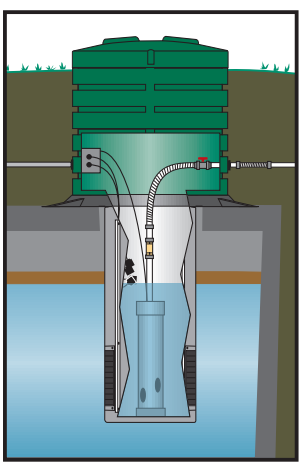
U.S. 5,382,357, 5,482,621, 5,683,577, 5,580,453, 5,582,716, 5,591,331, 4,710,295, 5,593,584, U.S. Des. 386,241,349067, 4605501,5098568, Des. 309007 Canadian: 2,135,937 New Zealand: 264824

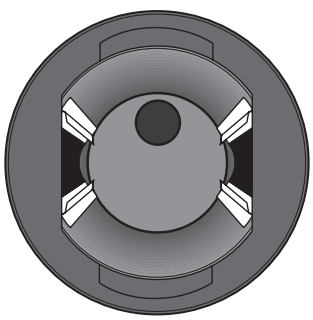
ZABEL environmental technology™

ZEUS™
ZABEL ENGINEERED UNIFIED SYSTEM

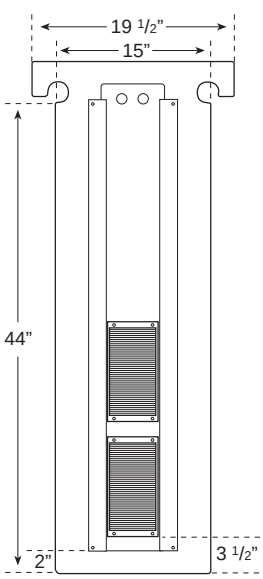
FILTERED PUMP VAULTS

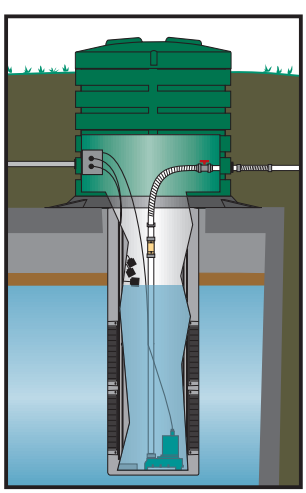


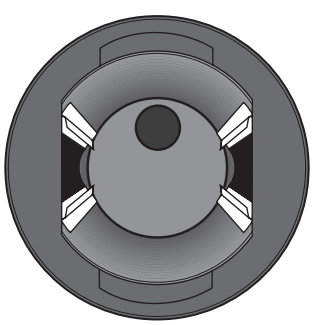




FPV-H-36-2
FPV-H-36-4







FPV-H-44-2
FPV-H-44-4

PRICES ON PAGE 62

The ZEUS™ Filtered Pump Vault System includes seven pump vaults of two basic styles: Hanging style and Interlocked. The Hanging style pump vaults come in two filter designs: A100 and A1800 style slotted plates. The Interlocked FPV comes only with the A1800 style slotted plates. These parts are designed to fit those from the ZEUS™ Riser & Basin System, Discharge System and Alarm & Control System to make complete STEP System Packages.

Zabel™ Recommendation: Any configuration of Risers used **should not** exceed 48" in height.

The product(s) shown are covered by one or more of the following patents:

U.S. 5,382,357, 5,482,621, 5,683,577, 5,580,453, 5,582,716, 5,591,331, 4,710,295, 5,593,584, U.S. Des. 386,241,349067, 4605501,5098568, Des. 309007 Canadian: 2,135,937 New Zealand: 264824

ZEUS™ Filtered Pump Vaults Product Specification

1. Product Name: Zabel™ Filtered Pump Vaults, Hanging or Interlocking styles
2. Model Number: FPV-H34-A101, FPV-H36-2, FPV-H36-4, FPV-H44-2, FPV-H44-4, FPV-I36-2
3. Applications: Appropriate for use in all STEP systems with submersible effluent pumps, sewage pumps and high head turbine pumps.
4. Performance Specification: All flows for the FPV-H34-A101 were determined to be laminar at rates up to 34 gpm. All flows for FPV-H36-2, FPV-H36-4, FPV-H44-2, FPV-H44-4, FPV-I36-2 were determined to be laminar at rates up to 90 g.p.m. It was concluded that the pumps tested with the FPV as a system did "not generate enough turbulence to materially disturb the solids in the septic tank system."

FPV Septic Tank Turbulance Test Results FPV-H36-2, FPV-H36-4, FPV-H44-2, FPV-H44-4, FPV-I36-2				
Flow Rate @	**0" Theoretical**	**1" From Filter**	**6" From Filter**	**12" From Filter**
5 gpm	0.042 fps	< 0.02 fps	< 0.01 fps	< 0.01 fps
15 gpm	0.128 fps	< 0.06 fps	< 0.03 fps	< 0.01 fps
30 gpm	0.255 fps	< 0.08 fps	< 0.04 fps	< 0.02 fps
40 gpm	0.34 fps	< 0.09 fps	< 0.05 fps	< 0.02 fps
80 gpm	0.68 fps	< 0.20 fps	< 0.06 fps	< 0.02 fps

FPV Septic Tank Turbulance Test Results FPV-H34-A101				
Flow Rate @	**0" Theoretical**	**1" From Filter**	**6" From Filter**	**12" From Filter**
8 gpm	0.122 fps	< 0.02 fps	< 0.01 fps	< 0.01 fps
34 gpm	0.520 fps	< 0.05 fps	< 0.03 fps	< 0.02 fps

5. Certified Pumps: The following pumps have been tested by Zabel™ and have been certified for use with the following Filtered Pump Vaults: FPV-H36-2, FPV-H36-4, FPV-H44-2, FPV-H44-4, FPV-I36-2.
   5.1. [1] HYDROMATIC Pump Models SP50, SW/VS33, SHEF33, SHEF25, OSP33, SPD100H, SHEF50, SKHD150, SP40, SHEF100 and SPD50H.
   5.2. [2] F.E. MYERS Pump Models SSM33, ME3H, ME3F, ME40, ME50, ME75, ME100, ME150, P51, P102, MW50, and High Head Turbine Pump Models 2NFL51-8E, 2NFL52-8E, 2NFL72-8E, 2NFL102-8E, 2NFL51-12E, 2NFL52-12E, 2NFL72-12E, 2NFL102-12E, 2NFL51-20E, 2NFL52-20E, 2NFL72-20E, 2NFL102-20E, 2NFL152-20E, J1025BE, J1525BE, J1035BE and J1535BE.
6. Materials: All materials are non-corrosive. For the FPV-H34-A101 the pump vault tank-high density polyethylene, case, lid & nuts-rigid vinyl PVC, Filter discs-high impact polystyrene, rods-high density polyethylene. For the FPV-H36-2, FPV-H36-4, FPV-H44-2, FPV-H44-4, FPV-I36-2 the pump vault, filter panel, trim strips, and maintenance plate - linear low density polyethylene (LLDPE); Filter plate - polypropylene
7. Installation in new or existing systems: For the hanging FPV's center 15-inch filtered pump vault in the septic tank outlet access opening of at least 16 inches in diameter. Thread 1-1/2" schedule 40 pipe through the handles to bridge the access opening in the tank. If 6" adapter has been cast into the lid simply lower the FPV through the opening and allow the pump vault to rest on the adapter. For the FPV I-36 it is a matter of simply lowering the pump vault into the 38" basin and turning to the right to lock into place.
8. Service method: A professional onsite service company shall perform all onsite system service. Pump the tank to the lowest level practical. For the FPV-H34-A101 disconnect the discharge assembly from the pump, remove the pump and floats. Remove the Filter cartridge and rinse with clean water. Return the cleaned Filter cartridge to the bottom of the pump vault. For the FPV-H36-2, FPV-H36-4, FPV-H44-2, FPV-H44-4, FPV-I36-2 Insert the maintenance plate behind the filter panel to be cleaned all the way to the bottom of the tank. Remove the filter panel and rinse the filter plate with clean water. Return the cleaned Filter Panel and repeat until all panels have been cleaned. Visually inspect the pump and float switches. After servicing return pump and a float to original positions and remove the maintenance plate. They normally will not require adjustment unless there is a malfunction.
9. Warranty: The Filtered Pump Vaults are warranted to be free from defects in material and workmanship for two years from the date of original installation. When the Filtered Pump Vaults are originally installed with a certified pump, the warranty period is ten years from the date of installaton. Zabel's™ liability is limited to repair or replacement of the Filtered Pump Vault only and in no event shall Zabel™ be liable for any consequential damages of any kind. Manufacturers warrant their respective pumps and controls.

[1] Dr. S. Lingireddy and Dr. S. Yost., Assistant Professor of Civil Engineering at the University of Kentucky, Department of Civil Engineering, *Evaluation of Zabel™ FPV100 Pump Vault and Hydromatic Pumps: A Study of Septic Tank Turbulence* Lexington, KY, June 10, 1996 and

[2] *Evaluation of Zabel™ FPV100 Pump Vault and Myers Pumps: A Study of Septic Tank Turbulence* Lexington, KY, September 3, 1996.

PRICE LIST

Price List

MADE IN USA

CALL TOLL FREE
1-800-221-5742

A1800-HIP-SF

A1800-HIP

A1800

A1807

A1807-HIP

ZABEL™
WASTEWATER FILTERS & ACCESSORIES

PART NO	RESIDENTIAL FILTERS	LIST	ONE +	10+	30+	50+
	A1800 Case & Cartridge					
A1800	Standard Filter	49.95	43.00	35.00	34.00	33.00
A1800-HIP	High Performance Filter	55.95	49.00	41.00	40.00	39.00
A1800-HIP-SF	HIP SmartFilter™	155.95	149.00	141.00	140.00	139.00
	A1801 Cartridges					
A1801	Standard Cartridge	39.95	33.00	25.00	24.00	23.00
A1801-HIP	High Performance Cartridge	45.95	39.00	31.00	30.00	29.00
A1801-HIP-SF	HIP SmartFilter™ Cartridge	145.95	139.00	131.00	130.00	129.00
	A1807 Concrete Baffle Cartridges					
A1807	Standard Cartridge	49.95	43.00	35.00	34.00	33.00
A1807-HIP	High Performance Cartridge	55.95	49.00	41.00	40.00	39.00

A100

A100-HIP

A300

A300-HIP

	COMMERCIAL FILTERS					
PART NO	**A100 Case & Cartridges**	**LIST**	**ONE +**	**10+**	**30+**	**50+**
A100	Standard Filter	169.95	133.00	108.00	102.00	98.00
A100-HIP	High Performance Filter	229.95	183.00	182.00	181.00	180.00
	A101 Cartridges					
A101	Standard Cartridge	134.95	98.00	73.00	67.00	63.00
A101-HIP	High Performance Cartridge	194.95	133.00	132.00	131.00	130.00
	HIGH STRENGTH FILTERS					
PART NO	**A300 Case & Cartridges**	**LIST**	**ONE +**	**10+**	**30+**	**50+**
A300	Standard Filter	199.95	163.00	138.00	132.00	128.00
A300-HIP	High Performance Filter	269.95	223.00	222.00	221.00	220.00
	A301 Cartridges					
A301	Standard Cartridge	149.95	113.00	88.00	82.00	78.00
A301-HIP	High Performance Cartridge	204.95	158.00	157.00	156.00	155.00

A100/A300-ADA

FC100

TH100

SEAL

PART NO	**ACCESSORIES**	**LIST**	**ONE +**	**10+**	**30+**	**50+**
A100/A300ADA	Extensing Adapter	29.95	19.00	18.00	17.00	16.00
FC100	Flow Control/Maintenance Plate	9.95	9.00	8.00	7.00	6.00
TH100	Filter Service Extractor (T Handle)	34.95	32.00	30.00	28.00	26.00
SEAL	Filter Tamper Seal	2.95	2.00	1.90	1.80	1.70

ZEUS™

ZABEL™ ENGINEERED UNIFIED SYSTEM

JUNCTION BOX

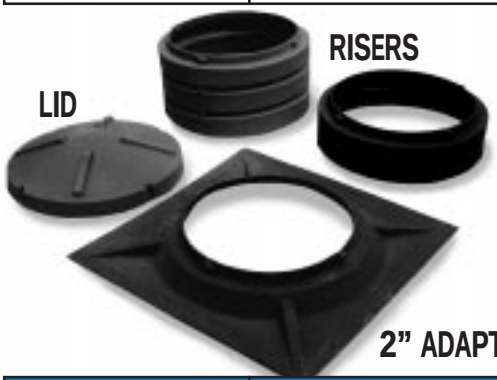
INDOOR ALARMS

OUTDOOR ALARMS

CONTROL PANELS

PART NO	ALARM & CONTROL SYSTEM	LIST	ONE +	10+	30+	50+
AC-JSB-3	Junction/Splice Box w/3 Connectors	36.95	32.00	31.00	30.00	29.00
AC-JSB-5	Junction/Splice Box w/5 Connectors	36.95	35.00	34.00	33.00	32.00
AC-A-I-SF	Alarm - Indoor-SmartFilter™	128.95	98.00	96.00	94.00	92.00
AC-A-O-SF	Alarm - Outdoor-SmartFilter™	136.95	106.00	104.00	102.00	100.00
AC-A-I	Alarm - Indoor	116.00	86.00	84.00	82.00	80.00
AC-A-O	Alarm - Outdoor	146.95	116.00	114.00	112.00	110.00
AC-ACB-O	Alarm w/ Control Block - Outdoor	186.95				
AC-CP-S-S	Control Panel-Simplex-Switch	459.95				
AC-CP-S-C	Control Panel-Simplex-Contactor	492.95				
AC-CP-S-C-T	Control Panel-Simplex-Timed	585.95				
AC-CP-D-C	Control Panel-Duplex-Contactor	764.95				

ZEUS™ Alarm & Control System
May only be purchased
with ZEUS™ packages.



LID

RISERS

2" ADAPTER

BASIN

CA100

PART NO	RISER & BASIN SYSTEM	LIST	ONE +	10+	30+	50+
RB-TA-T-20x2	20" Tank Adapter - Top 2"	45.95	36.00	35.00	34.00	33.00
RB-TA-F-20x6	20" Tank Adapter - Form 6"	35.95	26.00	25.00	24.00	23.00
RB-R-20x6	20" Riser x 6"	35.95	26.00	35.00	24.00	23.00
RB-R-20x12	20" Riser x 12"	45.95	36.00	35.00	34.00	33.00
RB-R-20x38	20" Riser x 38"	85.95	76.00	75.00	74.00	73.00
RB-R-26x6	26" Riser x 6"	39.95	30.00	29.00	28.00	27.00
RB-R-26x12	26" Riser x 12"	49.95	40.00	39.00	38.00	37.00
RB-R-26x38	26" Riser x 38"	89.95	80.00	79.00	78.00	77.00
RB-TA-T-26x2	26" Tank Adabter - Top 2"	49.95	40.00	39.00	38.00	37.00
RB-TA-F-26x6	26" Tank Adapter - Form 6"	39.95	30.00	29.00	28.00	27.00
RB-B-20x12	20" Basin x 12"	45.95	36.00	35.00	34.00	33.00
RB-B-20x38	20" Basin x 38"	85.95	76.00	75.00	74.00	73.00
RB-B-26x12	26" Basin x 12"	49.95	40.00	39.00	38.00	37.00
RB-B-26x38	26" Basin x 38"	89.95	80.00	79.00	78.00	77.00
RB-L-20	20" Lid	48.95	39.00	38.00	37.00	36.00
RB-L-26	26" Lid	52.95	43.00	42.00	41.00	40.00
CA100	Container Assembly	99.95	90.00	89.00	88.00	87.00

PART NO	FILTERED PUMP VAULT SYSTEM	LIST	ONE +	10+	30+	50+
FPV-H34-A101	Hanging 34" W/A101 Filter	139.95	129.00	118.00	117.00	116.00
FPV-H36-2	Hanging 36" W/2 Filter Plates	189.95	179.00	175.00	174.00	173.00
FPV-H36-4	Hanging 36" w/4 Filter Plates	199.95	189.00	185.00	184.00	183.00
FPV-H44-2	Hanging 44" w/2 Filter Plates	209.95	199.00	195.00	194.00	193.00
FPV-H44-4	Hanging 44" w/4 Filter Plates	219.95	209.00	205.00	204.00	203.00
FPV-I36-2	Interlocked 36" w/2 Filter Plates	189.95	179.00	168.00	167.00	166.00
PART NO	**DISCHARGE SYSTEM**	**LIST**	**ONE +**	**10+**	**30+**	**50+**
DS-TD-1.25	*Turbine Discharge1.25"	85.95	78.00	76.00	74.00	72.00
DS-ED-1.5	*Effluent Discharge1.5"	79.95	72.00	70.00	68.00	66.00
DS-CV-1.25	Check Valve1.25"	36.95	32.00	31.00	30.00	29.00
DS-CV-1.5	Check Valve1.5"	38.95	34.00	33.00	32.00	31.00
DS-ASV-1.25	Anti-Siphon Valve1.25"	36.95	32.00	31.00	30.00	29.00
DS-ASV-1.5	Anti-Siphon Valve1.5"	38.95	34.00	33.00	32.00	31.00
DS-GT-1.25	1.25" Grommet	3.95	2.80	2.60	2.40	2.20
DS-GT-1.50	1.50" Grommet	3.95	2.80	2.60	2.40	2.20
DS-GT-2.0	2.0" Grommet	3.95	2.80	2.60	2.40	2.20
DS-GT-3.0	3.0" Grommet	4.95	3.50	3.30	3.10	2.80
DS-GT-4.0	4.0" Grommet	4.95	3.50	3.30	3.10	2.80


FLOW DIVIDER


FLOW DIRECTOR

PART NO	DISTRIBUTION SYSTEM	LIST	ONE +	6+	12+	36+
Z200	Flow Divider	32.95	29.00	28.00	27.00	26.00
Z200D	Flow Director	37.95	34.00	33.00	32.00	31.00

*includes true union ball valve & flexible connector-check or anti-siphon valve extra

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Point of Sale Display - Zabel Filters Out Perform All Other	8.50

A1800 DEMO TANK

A100/300 DEMO TANK

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A100/300	475.00
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No returns without prior approval. Product may be returned within 30 days of purchase order date for full refund if returned in unopened box. A 20% restocking fee will be charged if boxes opened & re-sealed or return is made after 30 but within 90 days of purchase. Returns after 90 days will be on a case by case basis. All freight will be charged to the customer's account.

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1.5% late fee charged each month or portion thereof for the unpaid balance. Timely payments are very important and this late fee will be charged to all accounts that are paid late.

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All products are warranted against defects in material and workmanship for a period of one year from the date of purchase unless longer periods are specifically stated on product information sheets. In no event shall Zabel be liable for any consequential damages or any labor, material, freight or expense required to replace, correct or reinstall the product. Zabel's liability is limited to repair or replacement of the part. All warranties are void if the product has been improperly modified, applied or installed, subjected to misuse or abuse. Except as stated herein, there are no warranties express or implied, including the warranty of merchantability or warranty of fitness for a specific purpose.

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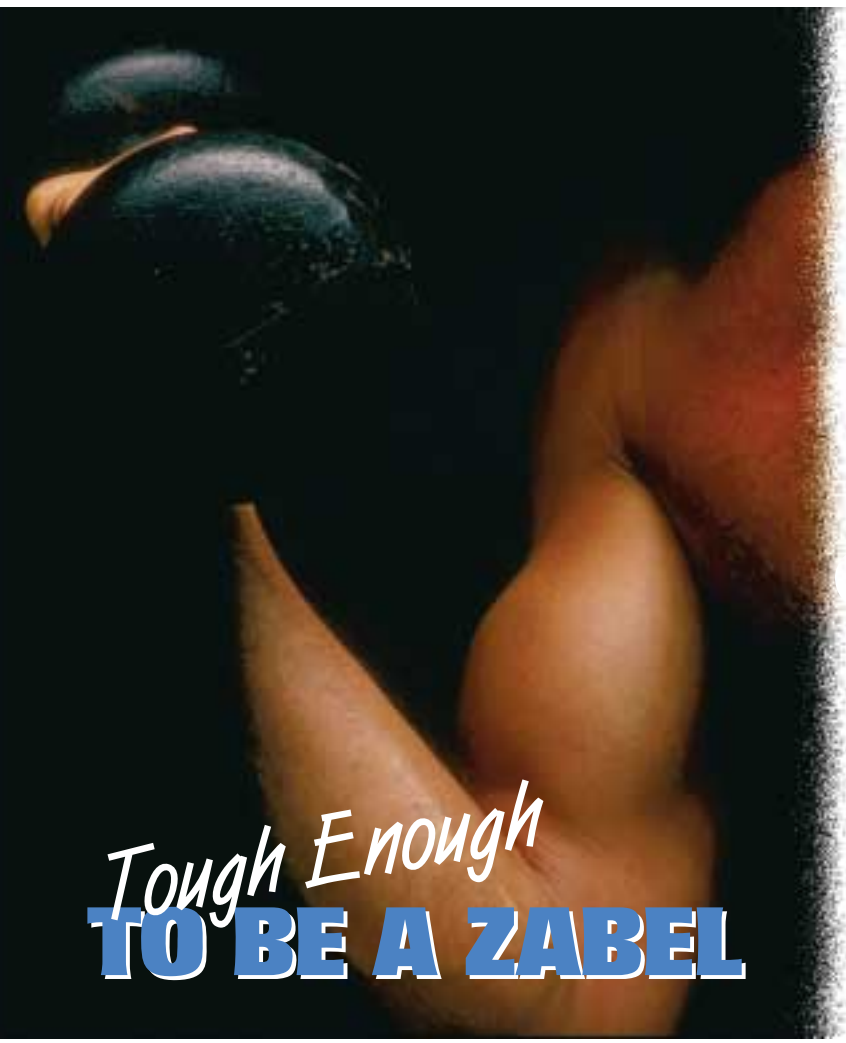
ZEUS™ Access System

ZABEL ENGINEERED UNIFIED SYSTEM



Patent Pending

MADE IN USA

The *ZEUS*™ Access System includes six interchangeable parts: two septic tank adaptors, three risers and a lid. The patent pending interlocking system makes this Zabel product resistant to unauthorized entry and provides protection from ground water infiltration.

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