

Created by:

**Brian Reynolds**

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# Technical Brief

## Curved False Bottom Design Flaws



### Topic of Discussion:

**Pressure Vessel Filter**

**Under Drain Design**

### Focus:

**Curved False Bottom  
Design Flaw**

Date: 10/31/2023

Additional documentation:

[HFS Series - Hungerford & Terry \(hungerfordterry.com\)](#)

[www.Hungerfordterry.com](http://www.Hungerfordterry.com)

It has been said that in some cases “Less is More” and the simple approach is better than an over engineered solution.

This may be true sometimes, but not when it comes to designing a Pressure Filter under drain system.

Case in point, the Curved False Bottom under drain system used by some pressure filter manufacturers appears to be a simple false bottom design that should work well, but a deeper review of the design and operating instructions shows there is reason for concern.

### Curved False Bottom Design Operating Criteria:

The typical pressure filter under drain must be designed to withstand substantial forces placed upon it and properly supported to withstand:

1. System operating pressure from well pump.
2. Varying differential pressure due to contaminant loading and flow rate changes.
3. Reverse pressure differential from backwash flow rate required for bed expansion.
4. Tons of gravel & media placed upon it.

Curved False Bottom limitations and warnings during normal operation found in some competitors O&M manuals. See example below.

❖ whenever the loss of head gauge, sensing the underdrain pressure, indicates an excessive headloss (somewhere between 5-8 psig.)

**NOTE:**

**IT IS HIGHLY RECOMMENDED THAT THE ABOVE HEADLOSS BE STRICTLY ADHERED TO, SINCE AN EXCESSIVE HEADLOSS CAN DAMAGE THE FILTER UNDERDRAIN.**

**NOTE:**

**IT IS HIGHLY RECOMMENDED THAT HEADLOSS DOES NOT EXCEED 8 PSI. AN EXCESSIVE HEADLOSS WILL DAMAGE GREENSANDPLUS FILTER MEDIA**

This DP design limitation warning is disguised as a media limitation.

**GreensandPlus can operate over 10psid with no problems**

**\*\*Restrictions on head loss means more frequent backwash cycles and wasted water.**

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### Curved False Bottom Failure Mode:

The concern of high differential pressure is based on the potential for catastrophic failure of the false bottom. The cause of high DP can be:

1. Improper setting or dislocation of trough baffle plates resulting in poor cleaning during backwash.
2. Excessive contaminant loading in media bed due to infrequent backwash cycles or incomplete cleaning.
3. Defective trough based backwash collection system or air distributor piping system.
4. Clogged under drain nozzle opening slits restricting flow.

### Curved False Bottom – Fabrication of Design Flaw

The weak link in the fabrication of the arch into a pressure filter design begins with the welding. Due to the radius of the vessel wall and the curvature of the false bottom design, the ability to produce high integrity welds becomes a challenge. Welding first pass, cleaning slag and applying remaining weld passes is difficult with small confined space available to work. With the addition of an interior lining requirement, the potential for accelerated corrosion increases.

This can easily be seen in the diagram below. Fig.1

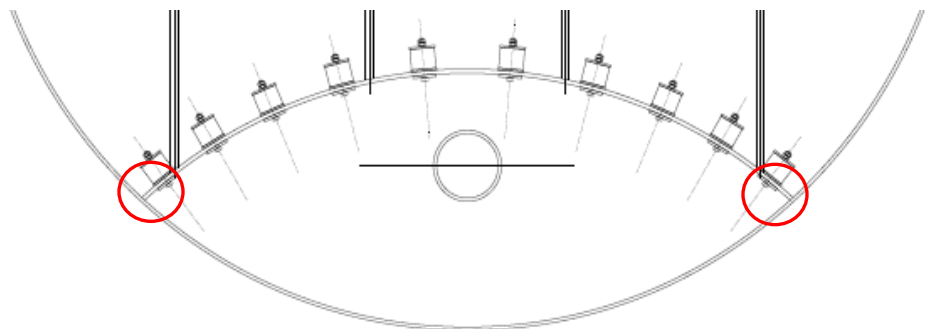


Fig. 1

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H&T has been asked to rehab or replace many of our competitors filter systems due to a variety of failure modes including false bottom failures as shown in the examples below.



Fig.2

All views are below the curved false bottom where only treated water should be found, not media.



Fig.3

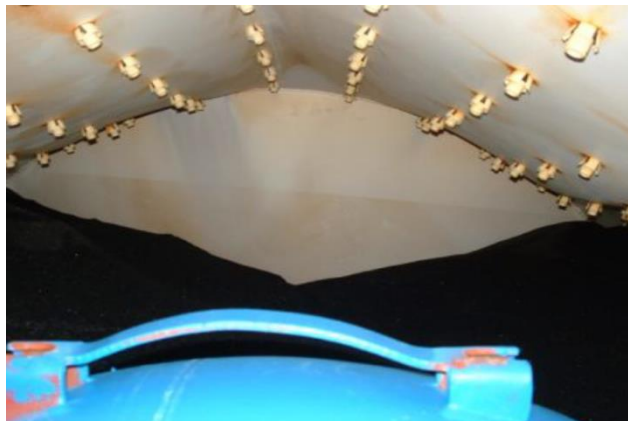


Fig.4

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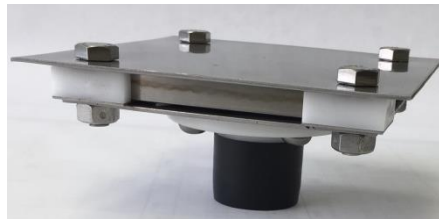
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### **The Solution:**

The location of the under drain collector / backwash distributor piping is the most difficult and expensive area to access. Therefore it would stand to reason its design should be as robust as possible.

With over 100 years of experience, H&T has standardized on what we feel that design should look like. The H&T Self-Cleaning Sand Valve under drain with header-lateral piping system and concrete sub-fill provides a design to last many decades.



H&T Self-Cleaning Sand Valve.

More info can be found by following this link.

[HFS Series - Hungerford & Terry \(hungerfordterry.com\)](http://www.hungerfordterry.com)

Fig.5



Fig.6



Fig.7

**Sand Valve Under Drain System - Pre & Post Concrete Fill**

For assistance with any pressure filter rehab project or new filter design, reach out to our technical sales department for support.