OSS Commercial Designer Workshop

Dose Tank and Effluent Pumps

Alice R. Quinn November 7, 2017



11/7/2017



Systems with Pumps

Elevated Sand Mound Pressure Distribution





Subsurface Trench

Flood Dosed

Subsurface Trench Pressure Distribution

Dosing Tank: Material and Design specs

- Manufacturer
- Materials
- Capacity
- Connectors
- Gallon per inch*
- Access for service
- Components



Use a

Manufacturer's

11/7/2017

Dose Tank

- Cross section view
- Gal/in or gal/ft
- Manufacturer
- Working capacity



• Maximum bury depth (if >2', manuf. statement)

YES	□ N/A	Check here if no "Dos Dosing Tank, Pump a	Meets or Exceeds Does Not Meet Informatio N/A								
		Cross section view p	rovided with all neces	sary information (see ex	ample drawing)?			494			
			Dose Tank #1	Dose Tank #2	Dose Tank #3						
		Tank Manufacturer:									
		Material:									
		Tank Liquid Capacity:									
		Tank Connector Mfgr:									
		ik Connector Model #:									
		Adequately sized as	disekable access port	5.				508			
\triangleleft		If dosing tank(s) will be buried greater than 2', plans must include manufacturer's maximum bury depth rating.									
		Lid installed above f			512						

Dose Tank Cross Section





Alarm

- Visible / Audible
- Separate circuit from pump
- Location?





Floats/controls/junction box

- Liquid level sensors are only controls allowed in the dosing tank.
- NEMA 4X box junction box
 - Not in the tank
 - Installed in riser?
 - Optimally outside the tank and riser
- Control box





















Dose Volume

Dose to soil absorption field

Flood dosed	I DDF
Subsurface trench pressure distribution	I DDF or ¼ DDF Dependent upon SLR
Elevated sand mound pressure distribution	¼ DDF
Sand lined system	Dependent upon product used (1/3, 1/6, 1 DDF)

Drainback

Length of pipe X gallons/inch







^{11/7/2017}

18

123 gal

478 gal

369 gal













Effluent Pump

- Section 73 of the rule
 - Effluent pump
 - Not a grinder or sump pump
 - Sewage pump?
- Pump must fit the system
 - Flow
 - Total Dynamic Head
- Multiple pumps required for DDF over 750 gpd





Sizing the Effluent Pump

System flow

Flood Dosed

Table VIII - Required Effluent Pump Discharge Rates for Subsurface Trench Flood Dosed On-site Sewage							
Systems							
Design Daily Flow	V	Discharge Rate in Gallons per Minute					
150-299			30-35				
300-449	Dump r	un timo	30-35				
450-599	Fumpi		30-45				
600-749	10-15 n	ninutes	30-60				
750-899			38-75				
900+			45-90				

Pressure Distribution

Total number of perforations X Perforation Discharge Rate

Perforation Discharge Rate is dependent upon residual head required 3' residual head – 1.28 gpm per ¼" hole 2.5' residual head – 1.17 gpm per ¼" hole

Total Dynamic Head

Flood Dosed

(or pump assisted)

• Static Head

 Pump off to highest elevation

Friction Loss

- Length, diameter of effluent force main
- Equivalent length of fittings
- Other?

Pressure Distribution

(subsurface or elevated)

• Static Head

• Pump off to highest elev.

Friction Loss

- Length, diameter of EFM
- Fittings
- Other?
- Residual Head
 - ESM 3'
 - Sub PD 2.5' or 3'



Residual Pressure







Friction Loss

Table X - Friction Losses in Plastic Pipe (per 100 feet of pipe)															
Pipe Diameter, Flow (gpm), Velocity (v)2, and Friction Loss Head (Hf)1															
Flow (gpm)) 1" 1 ⁴		1 ¼" 1 ½" 2"			1 1/4"		1 1/2" 2" 2		2 1⁄2"				4	"
Q	v	H _f	v	H _f	v	H_{f}	v	H _f	v	H _f	v	H _f	v	H _f	
1	0.37	0.11													
2	0.74	0.38	0.43	0.10											
3	1.11	0.78	0.64	0.21	0.47	0.10									
4	1.49	1.31	0.86	0.35	0.63	0.16									
5	1.86	1.92	1.07	0.52	0.79	0.24									
6	2.23	2.70	1.29	0.71	0.95	0.33	0.57	0.10							
8	2.97	4.59	1.72	1.19	1.26	0.56	0.77	0.17							
10	3.71	6.90	2.15	1.78	1.58	0.83	0.96	0.25	0.67	0.11					
15	5.57	14.7	3.22	3.76	2.37	1.74	1.43	0.52	1.01	0.22					
20	7.43	25.2	4.29	6.42	3.16	2.96	1.91	.87	1.34	0.37	0.87	0.13			
25	9.28	38.6	5.37	9.74	3.94	4.46	2.39	1.29	1.68	0.54	1.09	0.19			
30			6.44	13.6	4.73	6.27	2.87	1.81	2.01	0.76	1.30	0.26			
35			7.51	18.2		8.40	3.35	2.42	2.35	1.01	1.52	0.35	0.88	0.10	
40			0.50	23.6	3 0	10.7	3.83	3.12	2.62	1.22	1.74	0.44	1.01	0.12	
45					00-	13.	4.20	3.85	3.0	54	1.95	0.55	1.13	0.15	
50					\$8	6.	8	68	3.35	1.93	2.17	0.67	1.26	0.18	
60					17	3.	4	-6.62	4/	72	2.60	0.94	1.51	0.25	
70							6.70	8.86	4.09	3.07	3.04	1.25	1.76	0.33	
80									5.36	4.69	3.47	1.59	2.02	0.42	
90							8.60	14.3	6.03	5.83	3.91	1.99	2.27	0.52	
100									6.70	7.13	4.34	2.42	2.52	0.63	
125									8.38	10.9	5.43	3.72	3.15	0.96	
150											6.51	5.16	3.78	1.34	
175											7.60	6.90	4.41	1.79	
200											8.68	8.93	5.04	2.27	
225													5.67	2.84	
250													6.30	3.37	
275													6.93	4.13	
300													7.56	4.87	
325	325											8.19	5.70		
¹ This f	figure is	based o	n flows	for PV	C Sched	ule 40 1	oipe (flo	w coeff	icient: (-150). (Other va	lues for	friction	loss	
	al. Calculations using														
the Haz	zen-Wil	liams eo	quation :	may be	used if 1	provided	l with th	ie plan s	ubmitta	1.					
² Flow	velocity	must b	e at leas	st 2 fps;	flow ve	locities	above 5	fps sho	uld be a	voided.					
101000															

Table XI - Plastic Pipe Fitt e (ft.)* 4" 3" Fitting: 90° elbow, standard 11.1 13.1 2 90° elbow, long swee 7.9 12.0 45° elbow, standard 4.0 5.1 Tee Flow (run flow) 6.2 8.3 Tee Flow (branch flo 16.0 22.0 Gate Valve 2.0 3.0 0.8 1.5 1.6 0.6 1.0 2.0 2.8 Male/Female adapter 3.5 4.5 5.5 6.5 9.0 *Assigned values. Other values for friction loss may be used if documentation from the pipe manufacturer is provided with the plan submittal

Velocity 2-5 fps

- Equivalent Length of pipe for fittings
- Effluent force main must drain, unless installed below the frost line.

		Table IX	- Frost Pen	etrations in Indiana	(in inche	5)	
Adams	60	Franklin	48	Lawrence	48	Rush	54
Allen	60	Fulton	60	Madison	60	St. Joseph	60
Bartholomew	48	Gibson	42	Marion	54	Scott	36
Benton	60	Grant	54	Marshall	60	Shelby	54
Blackford	60	Greene	54	Martin	48	Spencer	- 36
Boone	54	Hamilton	54	Miami	60	Starke	60
Brown	48	Hancock	54	Monroe	48	Steuben	60
Carroll	60	Harrison	36	Montgomery	60	Sullivan	54
Cass	60	Hendricks	5	Morgan	10	Switzer d	42
Clark	36	Henry	5	Newton		or loe	60
Clay	54	aum	6	Ne		1	60
Clinton	54	tor	6			V.	48
Crawford	36	/aclc	4	Conge		ndorrgh	36
Davies	48		6.	Ow		ermili	60
Dearborn	48	Jay	60	Parke	60	Vigo	60
Decatur	48	Jefferson	42	Perry	36	Wabash	60
Dekalb	60	Jennings	48	Pike	42	Warren	60
Delaware	60	Johnson	54	Porter	60	Warrick	- 36
Dubois	42	Knox	48	Posey	42	Washington	36
Fildart 7/20	69	Kosciusko	60	Pulaski	60	Wayne	54
Flaylettle / / ZU	14	LaGrange	60	Putnam	54	Wells	60
Floyd	36	Lake	60	Randolph	54	White	60
						1	

Pump Curve



Plot ✓TDH ✓Flow ✓Design Point ✓Operating Point



Head

The pump performs *most* efficiently in the middle 1/3 of the performance curve

> The point of intersection of the two curves is where the pump will operate in the system.



The pump needs to work efficiently within the parameters required by the system

Modification of the system design



Increasing static head

Modification of the system design



Increasing static head

Modification of the system design



Increasing friction loss

Modification of the system design



Increasing friction loss

Decrease effluent force main diameter

Increase length of effluent force main or number of fittings



Pump Sizing Tools

- Manufacturer's Pump Sizing Spreadsheets
- St. Joseph County Pump Sizing Spreadsheets
- Sewage and Sump Pump Manufacturer's Association (SSPMA)
- IEHA Wastewater Management Committee guidance document and worksheets

Guidance Documents and Worksheets

- Product of IEHA WWMC
- Guidance Documents
 - Effluent pump sizing (pg 1-6)
 - Dose tank sizing (pg 8)
- Worksheets
 - Effluent Pump (pg 7)
 - Dose Tank (pg 9)



- Available on the website (<u>www.iehaind.org</u>)
- Based on requirements of 410 IAC 6-8.3
- Incorporates best practices
- Sizing must be compliant with the rule and any local ordinances.

IEHA WWMC guidance



Indiana Environmental Health Association Wastewater Management Committee http://iehaind.org/WMCGuidance.htm

Residential Onsite Sewage Systems Effluent Pump and Dose Tank Sizing Guidance Document

This document provides assistance on sizing effluent pumps and dosing tanks based on the requirements in Rule 410 IAC 6-8.3. The guidance incorporates best practices as determined by the IEHA WWMC. Effluent pump and dose tank sizing must be in compliance with the rule and local ordinances. Questions on sizing requirements or system components should be directed to the local health department having jurisdiction over the project.

There are differences between sizing an effluent pump for a flood-dosed system, an elevated sand mound pressure distribution system and a subsurface trench pressure distribution system. These differences are noted in <u>bold</u> where applicable. The letters and numbers in the sections correspond to the sections of the pump and dose tank sizing worksheets.

- A. Certain system parameters must be known prior to sizing an effluent pump for the system.
- The number of bedrooms and bedroom equivalents. See Sections 6 and 7 of the rule for definitions.
 Determine the Derive Deily Flow of the outer union the number of bedrooms and bedrooms.
- Determine the Design Daily Flow of the system using the number of bedrooms and bedroom equivalents in the home.

DDF = (Number of bedrooms & bedroom equivalents) X 150 gallons per day

- 3. The system type and soil absorption field size (in square feet and lineal feet).
- 4. The effluent force main diameter, in inches.
 - For <u>subsurface trench flood dosed systems</u>, the minimum inside diameter of the effluent force main is 1" and the maximum inside diameter is 4".
 - b. For <u>elevated sand mound and subsurface pressure distribution systems</u>, the minimum inside diameter of the effluent force main is 1%" and the maximum inside diameter is 4".
- 5. The total length of the effluent force main, in feet.
- The length of the effluent force main that drains back to the dosing tank. This will be 0 if the effluent force main drains to the soil absorption field (not recommended for pressure distribution systems).
- B. Determine the required pump discharge rate
 - 1. Subsurface Trench Flood Dosed Systems, use Table VII below from Rule 410 IAC 6-8.3-76(b).

Table VII - Required Effluent Pump Discharge Rates for Subsurface Trench Flood								
Dosed Onsite Sewage Systems								
Number of Bedrooms Discharge Rate in Gallons per Minu								
1	30							
2	30							
3	30-45							
4	30-60							
5	38-75							
6	45-90							

For systems with a range of acceptable flow rates in Table VII, it is recommended to choose a flow rate in the middle of the acceptable range. This will accommodate an increase or decrease in design flow rate if other system parameters dictate a needed d/angle () | 7

Eigsl 2013/04/12

IEHA WWMC guidance

		LY - 11	eside	Truat	ona		age .	-		Fullip Sizing Workshe
Project Name						Des	signer			
Project Addres	s					Dat	e			
A. System Info	rmation									
g. Number of E	edrooms a	nd Bed	room B	iquivale	ents					BR & Equiv.
2. Design Daily	Flow									gpd
	5. L					5-31A				square feet
	Subsu	mace r	1000 L	oseo		SOIL A	osorpt	ION A	rea	lineal feet
 Onsite 						Aggre	gate B	ed		square feet
System Type						Basal	Area			square feet
and size	Deerat	ed san		ina		Num	berofi	ateral	s	laterals
(cneck system	Fiess					Perfo	rations	/late	ral	perforations
include sizion						Total	perfor	ations	:	perforations
information)	5.1			_		SAF A	rea			square feet
	Distri	mace I	ressur	e		Soil L	oading	Rate		gpd/ft ²
	Distric	Jucion				Total	perfor	ations		perforations
4. Effluent Ford	e Main Dia	meter								inches
5. Effluent Ford	e Main Len	gth								feet
6. Length of ef	fluent force	main t	hat dra	ins to	dose t	ank				feet
Pump Disc	haree Rate									rom
C. Total Dore	Volume Col	culatio	-							or
 Deve Value 						-	1 D	DF fo	r FD	(& PD with SLR<1.20)
1. Dose volum	e to SAF					69	% D	DF fo	r ES	M (& PD with SLR=1.2)
2. Drainback V	olume (use	A6 len	;th)			sal.	0 if	EFM	drai	ns to SAF
3. Total Dose V	olume (C1 -	+C2)								gallons
D. Total Dynar	nic Head Ca	lculati	on							
L. Static Head						ft.	Elev	vation	dif	ference
2. Type and Si	e of Fitting	Num	er of F	ittines	Equiv	alent L	neth of	r fittir		Equivalent Length
				- X					-	feet
				X				-+	=	feet
				X				-+	=	feet
				X				-+	=	feet
a. Total Fourival	ent Length	of Firri	nes (su	menui	ivale of	le neth	s from	abow	•)	feet
 Total Equiva 	ent Length	ofFor	e Mair	n for Fr	iction	Loss (A	5 + D2=	1	-/	feet
 Eriction Lor 	(use legent	hin D2	5)				In tot	y al ec:	uive:	ent length of FEM
and the test	Assessed Br	101 02	~/			n.,	0124.5	in cu		and stanger of them
 Design Head 						ft.	25-3	in Su	den bsi	ns, o in cowi bystems and inface Pressure Distribution
4. Total Dynam	ic Head (D1	+ D2 c	+D3)				2.2.2		221	feet
E Pump Selec	tion (attac		M	anufac	turer					
pump peref	umance cu	nel	-Wi		ladel					
bauch beur	and an ore of	ine j		W	logel					

Date of Review

LHD Reviewer

Approved Not Approved

____ County - Residential Onsite Sewage Dose Tank Sizing Worksheet

Project Name	Designer	
Project Address	Date	

Dose Tank Manufacturer				
Dose Tank Material (check one)	Concrete	Poly/Plastic		Fiberglass
Dose Tank Liquid Volume (gal.)			Ş	al.
Dose Tank Capacity (G/I)			g	al./in.

Attach a manufacturer specific cross sectional view of the dosing tank, depicting float settings, to this worksheet as part of the plan submittal.

Dose Tank Sizing - Capacity Chart									
	H	leight (in)	Tank	Volume (gal)					
Pump & Pedestal Submersion (P)		PH	in.	PV	gal.				
Total Dose (D)		DH	in.	DV	gal.				
Freeboard (F)	Alarm	AH	in.	AV	gal.				
Freeboard (F)	Reserve	RH	in.	RV	gal.				
Total (P + D + F)**		in.		gal.					

**NOTE: The sum of the heights and the sum of the volumes must be less than or equal to the tank capacity as identified on the manufacturer's cross section. A manufacturer's cross section view must be submitted with the installation plan.

It is very important that the system be installed in a manner that is consistent with the design. If the dose tank and/or the effluent pump specified in the plan submittal is not the same as what is going to be installed at the site, revised dose tank and/or effluent pump information must be submitted in writing, by the system designer, to the local health department. The local health department must approve the design changes before installation.

Keyc Q/I=Tank Capacity (pd/in) PH = Pump & Poincial Height (in) PV = Volume required to submongs pump (pd)
 DH = Total Dose height (in) DV = Volume of the Total Dose (pd)
 At = Attern Totalt (in) AV = Volume sciencial for aliam (pd)

Flood Dosed Example

WELCOME TO THE OFFICIAL SITE FOR ST. JOSEPH COUNTY INDIANA

WEATHER

Home Nursing Food Services Emergency Prep. Environmental Health Education Lead Pandemic Influenza Vital Records

Other Services H.S. Assessment

Additional Links

Residential Septic Pump Spreadsheets

Introduction & Overview Brief Instructions Spreadsheets & Requirements for use in St. Joseph County Spreadsheets for Other Counties Help for Spreadsheets

Introduction & Overview

These spreadsheets are available to the public for the purpose of checking a septic pump design for compliance with <u>410 IAC 6-8.3</u>. They are not to be used as a designer's sole design resource. Also, pump manufacturers will size pumps for free, but they do not verify that a septic design complies with IAC 6-8.3 requirements. Therefore, these spreadsheets were created as a free tool for designers and regulators to verify code compliance.

The spreadsheets utilize an accurate method, the Operating Point Method, to check pump design. With a few minutes of input, the spreadsheets automatically: calculate the pump and system's operating point, check that operating point for compliance with IAC 6-8.3 as well as general engineering principles, and offer tips to remedy failed compliance. The spreadsheets yield precise results, while saving time.

Helpful videos which explain the spreadsheets:

http://www.stjosephcountyindiana.com/ departments/sjchd/spreadsheets.htm

Hold Harmless Agreement

This spreadsheet may be used to check the engineering design of a previously designed residential septic pump to a gravity absorption system. By using this spreadsheet, the user agrees to take full responsibility for the input, output, consequential conclusions and will hold harmless St. Joseph County and any affiliates thereof of any liability. This spreadsheet is not intended to be used as a dosing pump design spreadsheet, but rather is intended to check the suitability of the design for compliance to IAC 6-8.3 code & methodology.

Does the User agree to the aforementioned statement	NO
& release St. Joseph County of and & all liability?	NU

If "YES", type name	below:
Alice Quinn	

inn

BRIEF INSTRUCTIONS (See "Help" Worksheet for detailed instructions)

* The Hold Harmless Agreement must be accepted in order to use the spreadsheet.

- * ALL cells in tan coloring MUST be filled out for the spreadsheet to perform correctly.
- * Cells that are not colored tan are not editable.

* This spreadsheet should only be used to check a previously designed, single, dosing pump & single forcemain to a gravity absorption field to verify if the pump meets IAC 6-8.3 code requirements. This is not a comprehensive pump selection tool. See pump manufacturer representative for help selecting the best pump.

* The Item Numbers on the "Design Check" worksheet correspond to the Item Numbers on the "Help" worksheet.

* Quick Tip - If an operating point is too far to the right of the middle of the pump curve, then consider decreasing the forcemain size or selecting a smaller Hp pump.

Property Address:	Permit #
123 Main, Anytown, IN	1234

	INPUT DATA FROM PREVIOUS DESIGN							
 Select the previously designed dosing pump. If the pump is not on the list, then select "other" <u>as the make and</u> model and manually fill out the "Other Pump Curve" table to the right. 								
Make:	Barnes		[Model:	SP33]	
2. Fill out p	reviously desi	gned f	orce main geometry below	v:				
	Force	. Mair	Diameter (in):		2			
	Horiz	ontal	Length of Force Main (ft):		57			
	Verti	cal Lei	ngth of Force Main* (ft):		3.50			
	Pump	Off E	levation (ft):		987.60			
	Pump	On E	levation (ft):		989.36			
	Тор с	of Pum	p Elevation (ft):		987.50			
	High	est Ele	vation of Force Main (ft):		994.40			
	Where do	es For	ce Main drain after dose?		Dose Tank			

3. Fill out previously designed force main fitting schedule table below. The table assumes the fitting is same size of the force main. If custom fitting/equivalent lengths are desired, then select "Other" under fitting type:

Type of Fitting	No. of Fittings	Equiv. Length per Fitting(ft)	'Other' Fitting Type	'Other' Equiv. Length per Fitting(ft)
90°Elbow,Std Sharp Inside Rad	. 3	8.6		
45° Elbow, Standard	2	2.6		
Other	1	0.5	Pressure Filter	0.5
		0.0		
		0.0	11/7/2017	

3. Fill out previously designed force main fitting schedule table below. The table assumes the fitting is same size of the force main. If custom fitting/equivalent lengths are desired, then select "Other" under fitting type:

Type of Fitting	No. of Fittings	Equiv. Length per Fitting(ft)	'O	ther' Fitting Typ	e	'Other' Equiv per Fittin	. Length g(ft)
90°Elbow,Std Sharp Inside Rad.	. 3	8.6		-			
45° Elbow, Standard	2	2.6					
Other	1	0.5		Pressure Filter		0.5	
		0.0					
		0.0					
Total Equivaler	nt Length of	Straight Pipe D	ue to Fitt	ing Friction Los	ses (ft) =	31.5	
4. Describe the dosing tank geo	ometry:	Ave. Gal./In.	А	ve. Gal./Inch =	21.8		
5. How many bedrooms does t	he pump s	erve?	DDF =	Ent	ter Gallo	ons to Right =	450
6. Is the Pump Curve (shown below) current with the manufacturer's website? And is the					Respon	se	
curve not excessively wavey? And is the R ² value (shown on graph) greater than 0.97? See					'YES' to a	all 3	
"Help" tab for detailed explanation.					Questia		

Questions



^{11/7/2017}

 $R^{2} = 1$

60.0

5.2

11.1

49.8

8.3

10.3

45.0

IAC 6-8.3 CHECK - DOSING PUMP & FORCEMAIN DESIGN TO GRAVITY ABSORBTION FIELD					
Barnes SP33		CHECKED BY:	Alice Q	uinn	
8. Does the dosing pump apply DDF in one dose?	YES	Dose =	460gal	Req. Dose* =	460gal
9. Does the dosing pump operate at a flow rate within the required Daily Design Flow Rate?		Min. Required DDF (gpm) = 30			
		Max. Required DDF (gpm) = 45			
10. Is the effluent velocity between 2-5 ft/s?	YES	E	ffluent V	elocity (ft/s) =	4.33
11. Will the pump always be submerged?	YES				
12. Is effluent protected from freezing?	YES				

* The required dose is equal to the DDF (Daily Design Flow) to the soil absorption field (IAC 6-8.3-12) + the drainback volume of force main, if applicable. See the "Help" page for more info.

GENERAL PUMP DESIGN CHECK** (NOT REC VIRED BY IAC-6-8.3 CODE)						
13. Check for the position of the operating point within the pump performance curve. It should not be close to an extremety.	Questio nable	Pump operates within the middle x% of the performance curve (%)= 70%				
14. Is the pump run time greater than 10 minutes?	YES	Pump run time (min) = 10.86				

**These checks are rules of thumb. Please verify with manufacturer for recommendations.

TIPS

Move operating point to middle of curve by changing forcemain size, pump selection, and/or elevation difference.

Pros

- 7 Brands of pumps plus custom pump entry
- Easily compare different models or manufacturers
- Checks for code compliance
- Additional Engineering checks
- Points out errors and provides tips to correct
- Videos, help tabs, and visual aids

Concerns

- No wiggle room (pressure distribution systems)
- 3 spreadsheets for 3 types of systems
 - Flood dose
 - Pressure Trench
 - Elevated sand mound





ESM



ENVIRONMENTAL Zoeller Family of Water Solutions

Zoeller Company



System Head Curve and Pump Selection Tool

www.clarusenvironmental.com Design Tools System and Pump Curve Generator



ENVIRONMENTAL

Zoeller Family of Water Solutions-

Zoeller Company



System Head Curve and Pump Selection Tool







Pump Selecti Claras Ensiras	<u> 61 Ha</u> Pergarang Panglah Pangan)prealing Paial	Design Paint 55.5 GPM
Clares Paup 1			P 13.5' TOH
Flass Castral Orifiari Classe Pass 2			Project Data
Have Cardeal Orifiari	1		Projent Hame:
Zaeller Pass Co			Project Addee
Zaellee Paup 1	278/4278, 16a, 58Ha	75.7 GPH @ 14.8	
Zarller Page 2	161/4161. 8.5ks. 68Hs	81.3 GPH @ 16.2	Coolsel lofe:

Coror Zone Berry 111 GPH



* For Flow Deviations between 5% and 10%, consult local code for acceptability. Less than 5% [s]#[#][0] 7

Clarus / Zoeller Pump Curve Generator

Static Head Information

Static Head - elevation difference from low water to outfall System high point above outfall?



Friction Head Information Pipe		
How many different pipes in the system (not counting laterals)?	2	
Pipe 1 Length	7 feet	
Pipe 1 Size	2 inches	
Pipe 1 Class	SCH 40	
Pipe 2 Length	57 feet	
Pipe 2 Size	3 inches	50 % Total Flow
Pipe 2 Class	SCH 40	
Pipe 3 Length		
Pipe 3 Size		
Pipe 3 Class		
Pressurized Laterals?	Yes	Flow Deviation
How many are dosed at once?	4	Along Lateral
Length of one lateral	36 feet	6.9%
Size of lateral	1 1/4 inches	*
Class of lateral	SCH 40	T
	11/7/2017	



ENVIRONMENTAL

Zoeller Family of Water Solutions-

Zoeller Company



System Head Curve and Pump Selection Tool

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HOTE: THE DISPLAYED PUMP CURVES HAVE BEEN ADJUSTED TO ACCOUNT FOR THE EFFECT OF THEWEEP HOLE

Pump Solocti Ilaran Kaniraan Ilaran Pany 1	El Ha Tergarang radal Passas	Perrating Paint	Draiga Paia 65.5 GPM (P.15.51 TD)
Ing Control Orifine?			
larna Pamp 2			Project Data
Ina Castral Orifiar?			Project Hame
arller Page Co			Project Adde
aellee Paug 1	278/4278, 1ks, 58Hs	75.7 GPH (214.8	
arller Page 2	161/4161. 8.5ks. 68Hs	11.5 GPH (0.15.2)	Control Info:



Clarus / Zoeller Pump Curve Generator

Weep Hole Add-in Friction Multizone Valve Pressure Filter

System Type Residual Head Orifice size and number

Hazen-Williams C Factor Lateral Design Mode

Fittings & Discharge Assemblies						
Туре	Size		Quantity			
90 Elbow	2	inches	3			
Tee (branch flow)	3	inches	2			
45 Elbow	3	inches	2			

Special Friction Considerations		
Weep Hole	Yes	1/4 "
Add-In Friction	10 % of Pipe Loss	
Automatic Multizone Valve?	No	
Pressure Filter?	Yes	100 % Total Flow

Operating Head Information		
System Type	Low Pressure Pipe	
Required Pressure	3. feet	
Number of Orifices	52	
Size of Orifices	1/4 "	
Spider Valve Orifice Sizes (Data originates from Spider Valve Sizing Tab)		
valve olding rab)		

Factors and Coefficients	
Hazen-Williams C Factor	130
Discharge Coefficient (Cd)	0.61
Lateral Design Mode	On
11112011	

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ENVIRONMENTAL

Zoeller Family of Water Solutions-

Zoeller Company



System Head Curve and Pump Selection Tool





ENVIRONMENTAL

Zoeller Family of Water Solutions-

Zoeller Company



System Head Curve and Pump Selection Tool

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75.7 GPH @ 14.E

81.5 GPH @ 16.2

Project Address

Contant Info:

188 H. Senale Ane.

Alier Quine 317-518-4588 algaine@indb.in.gen

Indianapolis, IN 46284

For Flow Deviations between 5% and 10%, consult local code for a 11/7/2017

Zarller Pass Conserv Zarller Paas 1

Carller Page 2

278/4278, 16s. 58H

164/4464. 8.SL. 68W

Versian 4.88



Clarus / Zoeller Pump Curve Generator

Design Point

Zoom In

NOTE: THE DISPLAYED PUMP CURVES HAVE BEEN ADJUSTED TO ACCOUNT FOR THE EFFECT OF THE WEEP HOLE

Pump Selection	60 Hz Frequency		Design Point	Curve Zoom Range	100 GPM
Clarus Environmental Pumps Operating Points		70.7 GPM			
Clarus Pump 1			@ 14.8 ' TDH		
Flow Control Orifice?					
Clarus Pump 2			Project Data		Notes:
Flow Control Orifice?			Project Name:	ISDH Designer Workshop Sample	
			Project Address	Indiana Government Center North	
Zoeller Pump Company Pumps			100 N. Senate Ave.		
Zoeller Pump 1	270/4270, 1hp, 60Hz	73.1 GPM @ 15.4'		Indianapolis, IN 46204	
Zoeller Pump 2	161/4161, 0.5hp, 60Hz	79.9 GPM @ 17.2'	Contact Info:	Alice Quinn	
				317-518-4388	
				alquinn@isdh.in.gov	

Pick the pump(s)

Project Info and Notes

Clarus / Zoeller Pump Curve Generator

System / Pump Interaction Curves



Clarus / Zoeller Pump Curve Generator Pros

- Multiple force main sizes
- Easily compare 4 different pumps
- Adds in losses for weep hole
- Variable Hazen-Williams C factor
- Checks flow deviation along lateral
- Entry for "wiggle" room
- I spreadsheet for multiple system types
- Allows for use of other discharge assemblies (Spider valve, multizone valve, etc.)

Concerns

- Only 2 brands of pumps (Clarus and Zoeller)
- Does not check velocity





www.iehaind.org

Indiana Environmental Health Association Wastewater Management Committee

http://www.stjosephcountyindiana.com/ departments/sjchd/spreadsheets.htm

www.clarusenvironmental.com Design Tools System and Pump Curve Generator

