

**Project No. : 2327092-2**  
**Project Name : HARDEN**  
**Project Address : 1167 SW HOWELL RD, LAKE CITY FL 32024**

**POOL/ SPA HYDRAULICS WORKSHEET**DESIGN CIRCULATION FLOW PARAMETERS:

1. Pool circulation volume :  $V := 30 \text{ ft} \cdot 18 \text{ ft} \cdot 5 \text{ ft} + 6 \text{ ft} \cdot 18 \text{ ft} \cdot 9 \text{ in} = 20803.324 \text{ gal}$

2. Preferred turnover rate:  $t := 8 \text{ hr} = 480 \text{ min}$

3. Pool circulation flow rate :  $Q_p := \frac{V}{t} = 43.34 \text{ gpm}$

Add water feat. flow rate  $Q_{wf} := 25 \text{ gpm}$

Total circulation flow rate  $Q_c := Q_p + Q_{wf} = 68.34 \text{ gpm}$

4. Spa: Number of jets,  $n := 0$  [N/A.]

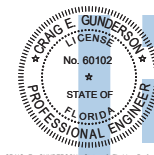
$$Q_{jet} := n \cdot 12 \text{ gpm} = 0 \text{ gpm}$$

(For single pump pool / spa combo, use the higher of No. 3 or No. 4 in the following calculations for the pool and spa.)

Number of Skimmers,  $N := 2$

Minimum design flow rate  $Q_{min} := \max(36 \text{ gpm}, N \cdot 35 \text{ gpm}) = 70 \text{ gpm}$

Design flow rate  $Q := \text{Trunc}(\max(Q_c, Q_{min}, Q_{jet}), 1 \text{ gpm}) = 70 \text{ gpm}$



Digitally signed  
by Craig E  
Gunderson  
Date:

2023.12.12  
13:29:10-05'00'

CRAIG E. GUNDERSON, State of Florida, Professional Engineer, License No. 60102. This item has been digitally signed and sealed by Craig E. Gunderson, P.E. on the date adjacent to the seal using a SHA-1 authentication code. Printed copies of this document are not considered signed and sealed and the signature must be verified on electronic copies.

**CRAIG E. GUNDERSON, P.E. #60102**  
**DATE:**

## PIPE SIZES & SIMPLIFIED TDH:

Maximum flow rate:  $Q = 70 \text{ gpm}$

FLOW AND FRICTION LOSSES PER FOOT - SCH. 40 PVC PIPE						
Pipe size (in)	Velocity					
	6 ft/s		8 ft/s		10 ft/s	
	gpm	ft	gpm	ft	gpm	ft
1	16	0.14	21	0.23	26	0.35
1 1/2	37	0.08	50	0.14	62	0.21
2	62	0.06	82	0.1	103	0.16
2 1/2	88	0.05	117	0.09	146	0.13
3	138	0.04	181	0.07	227	0.1
4	234	0.03	313	0.05	392	0.07
5	534	0.02	712	0.03	890	0.05

## Pipe Sizes Per 2020 FBC, 7th Edition:

Main Drain Branch Piping to be : **2.5"** to keep velocity @ 6fps max at flow rate = **88 gpm** max.

Suction/Trunk Piping to be : **2.5"** to keep velocity @ 8fps max at flow rate = **117 gpm** max.

Return Piping to be : **2.0"** to keep velocity @ 10fps max at flow rate = **103 gpm** max.

1. Friction loss (in suction/trunk pipe) in **2.5"** pipe per ft at  $f_{suction} := 0.09$

2. Friction loss (in return pipe) in **2.0"** pipe per ft at  $f_{return} := 0.16$

3. Length of suction pipe  $L_{suction} := 70 \text{ ft}$

TDH in suction pipe  $TDH_{suction} := L_{suction} \cdot f_{suction} = 6.3 \text{ ft}$

4. Length of return pipe  $L_{return} := 110 \text{ ft}$

TDH in return pipe  $TDH_{return} := L_{return} \cdot f_{return} = 17.6 \text{ ft}$

5. TDH in Piping  $TDH_{piping} := TDH_{suction} + TDH_{return} = 23.9 \text{ ft}$

6. Filter loss in TDH  $TDH_{filter} := 7 \text{ ft}$

7. Heater loss in TDH  $TDH_{heater} := 0 \text{ ft}$  [N/A.]

8. All other losses  $TDH_{other} := 16 \text{ ft}$  ...head losses in fittings, etc

9. Total simplified TDH  $TDH := TDH_{piping} + TDH_{filter} + TDH_{heater} + TDH_{other} = 46.9 \text{ ft}$

**Filter** (As Listed or Equal): Pentair TR100 Sand

**Pump** (As Listed or Equal) :

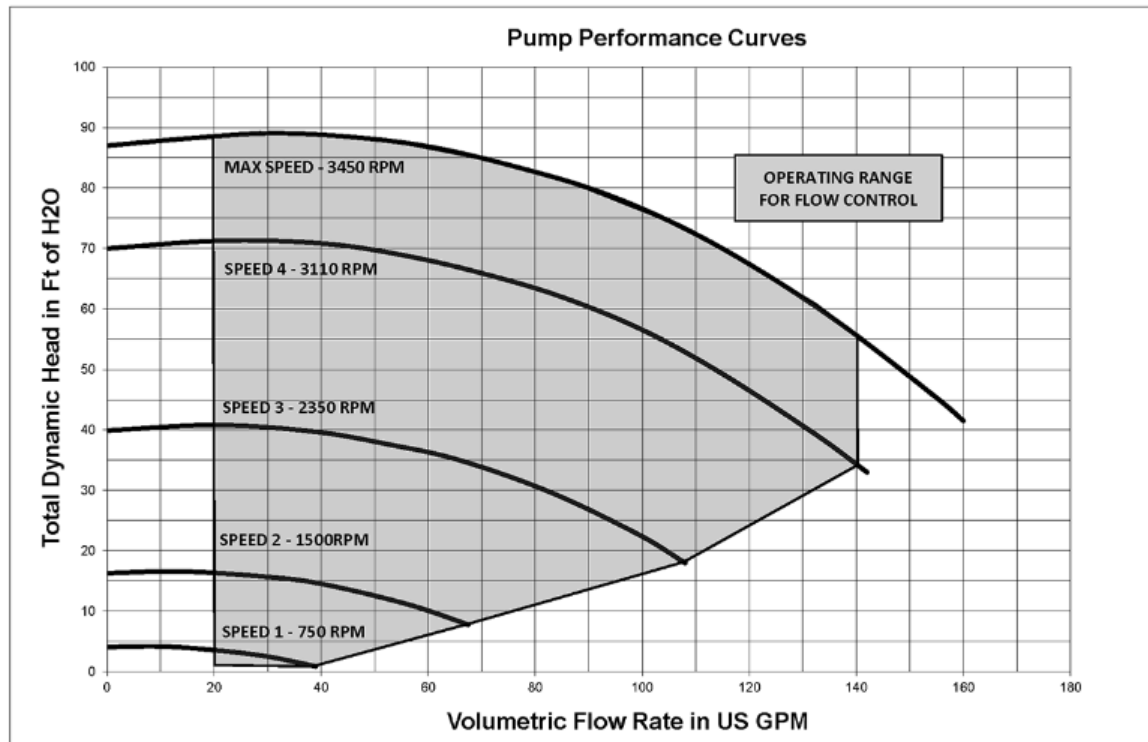
Manufacturer : Pentair

Model : IntelliFlo VS

Size / HP = 3.0

Maximum flow rate,  $Q = 70$  gpm

Total simplified TDH,  $TDH = 46.9$  ft



**Main Drain Cover** (As Listed or Equal):

Manufacturer : Paramount

Model : SDX2

Max. cover flow rate (floor) = 188 gpm

Cover Replacement Date = 5 years

Notes :

1. In flow suction outlets cover/grate must conform to most recent edition of ASME/ANSI A112.19.8 and be embossed with that edition approval. Single drains shall be unblockable. Center to center spacing of multiple drains shall be at least 3'-0".

2. Pump and Filter make, model and location cannot change without submitting a revised plan TDH worksheet.