

EQUIPOTENTIAL BONDING GRID:

ALL METAL PARTS SPECIFIED IN 680.26(B) MUST BE BONDED TO AN EQUIPOTENTIAL BONDING GRID WITH A SOLID COPPER CONDUCTOR NOT SMALL THAN 8 AWG. THE TERMINATION OF THE BONDING CONDUCTOR MUST BE MADE BY EXOTHERMIC WELDING, LISTED PRESSURE CONNECTORS, OR LISTED CLAMPS THAT ARE LABELED AS SUITABLE FOR THE PURPOSE. THE QUIPOTENTIAL BONDING GRID MUST EXTEND UNDER PAVED WALKING SURFACES FOR 3 FEET HORIZONTALLY FROM THE WATER (680.26(C)).

THE EQUIPOTENTIAL BONDING GRID MUST BE FORMED FROM EITHER OR BOTH OF:

THE STRUCTURAL REINFORCING STEEL OF A CONCRETE PERMANENTLY INSTALLED POOL, OUTDOOR SPA, OR OUTDOOR HOT TUB, TIED TOGETHER BY THE USUAL STEEL TIE WIRES.

THE METAL WALLS OF A PERMANENTLY INSTALLED POOL, OUTDOOR SPA, OR OUTDOOR HOT TUB

THE EQUIPOTENTIAL BONDING GRID CAN BE CONSTRUCTED WITH 8 AWG BARE SOLID COPPER CONDUCTORS BONDED TO EA OTHER AT ALL POINTS OF CROSSING BY EXOTHERMIC WELDING, LISTED PRESSURE CONNECTORS OF THE SET SCREW OR COMPRESSION TYPE, LISTED CLAMPS, OR OTHER LISTED FITTINGS (250.8).

THE EQUIPOTENTIAL BONDING GRID MUST COVER THE CONTOUR OF THE PERMANENTLY INSTALLED POOL, OUTDOOR SPA OR HOT TUB AND DECK EXTENDING 3 FEET HORIZONTALLY FROM THE WATER. THE EQUIPOTENTIAL BONDING GRID MUST BE ARRANGED IN A 1-FOOT BY 1-FOOT NETWORK OF 8 AWG CONDUCTORS, WITH A TOLERANCE OF 4 INCHES.

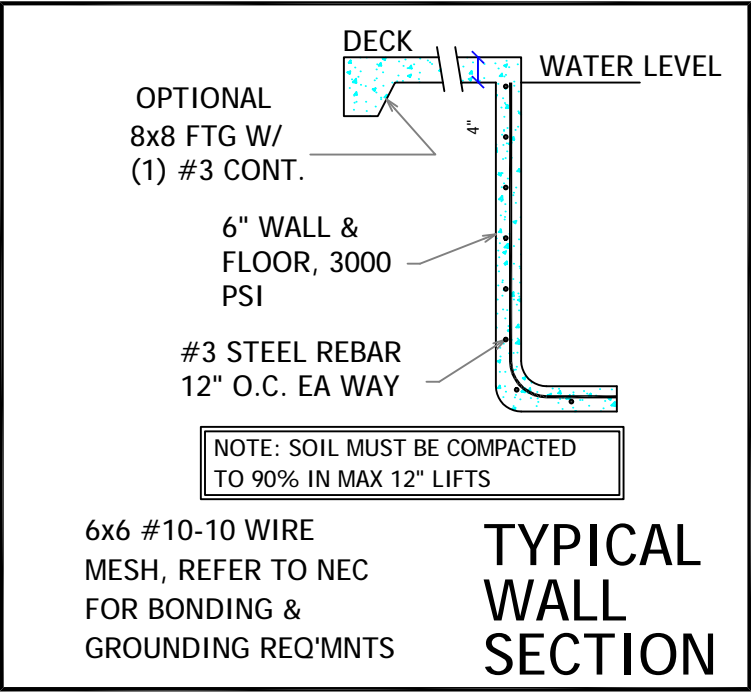
EXCEPTION: THE EQUIPOTENTIAL BONDING GRID SHALL NOT BE REQ'D TO BE INSTALLED UNDER THE BOTTOM OR VERTICALLY ALONG THE WALLS OF VINYL LINED POLYMER WALL, FIBERGLASS COMPOSITE, OR OTHER POOLS CONSTRUCTED OF NON-CONDUCTIVE MATERIALS.

ANY METAL PARTS OF THE POOL, INCLUDING METAL STRUCTURAL SUPPORTS, SHALL BE BONDED IN ACCORDANCE WITH 680.26(B). POURED CONCRETE, PNEUMATICALLY-APPLIED CONCRETE, AND CONCRETE BLOCK SHALL BE CONSIDERED CONDUCTIVE MATERIAL

GENERAL NOTES:

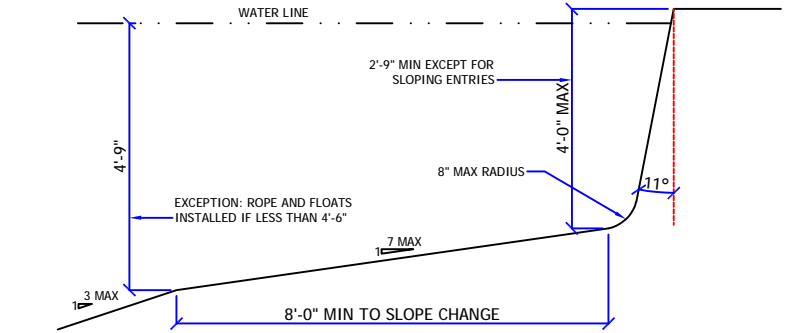
- 1) Per UL listing, pool motors require GFCI protection
- 2) FSPA requires the motor controller to be capable of 2 speeds, a time clock will not satisfy this unless it has 2 trip settings.
- 3) If heater installed (other than solar), it must comply with FBC-EC403.9.1 & have a cover per 403.9.3 (this applies to mechanical (not solar) heaters---cover required)
- 4) Outdoor swimming pools shall be provided with a barrier complying with Sections R4501.17.1.1 through R4501.17.1.14.
- 5) NEC 680.26(C) requires a conductive metal part of 9 sq., in. in direct contact with the pool water.
- 6) R4501.17.1.9 All doors and windows providing direct access from the home to the pool shall be equipped with an exit alarm complying with UL 2017 that has a minimum sound pressure rating of 85 dB at 10 feet.

STEPS: MIN. TREAD 10" x 12", 7" MIN RISER, 12" MAX RISER. INTERMEDIATE TREADS AND RISERS TO BE UNIFORM.

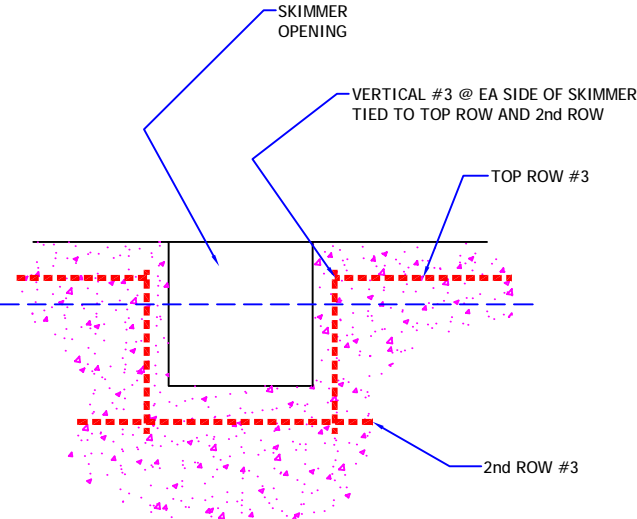
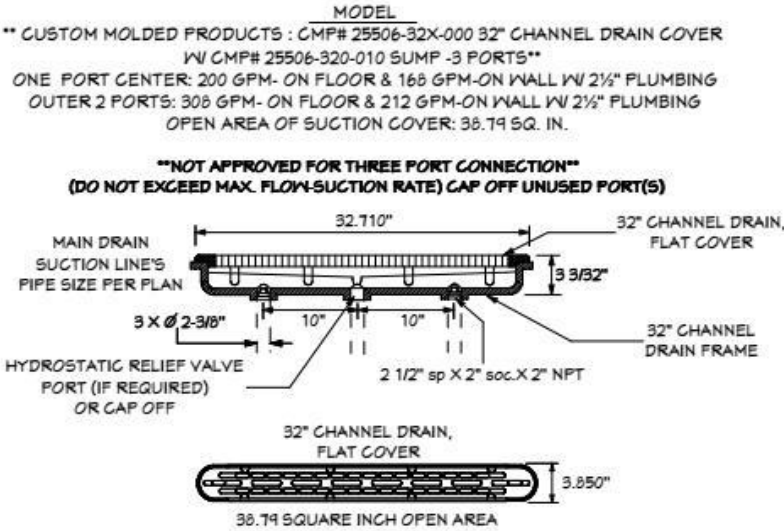


NOTE: IF ANY PART OF THE POOL ENCROACHES UPON THE ANGLE OF REPOSE, PLACE STEEL @ 6" o.c. EA WAY IN AREAS OF QUESTION

ENGINEERING NOTES:  
1. ALL WORK IS TO COMPLY WITH ALL APPLICABLE CODES & ORDINANCES.  
2. CONSTRUCTED OF 3000 PSI CONCRETE OR EQUAL WITH #3 REBAR 12" O.C. EACH WAY, TIED AT EVERY OTHER INTERSECTION. MIN COVER FOR REBAR IS 2.5"  
MIN OVERLAP IS 18".  
3.N/A  
  
4. ASSUMED SOIL BEARING = 2 KSF  
5. CIRCULATION SYSTEMS, COMPONENTS, & EQUIPMENT SHALL COMPLY W/ NSF 50.  
6. INSTALL CONTROL JOINTS @ 20'-0" ON CENTER IN POOL DECKING.  
7. PLANS TO CONFORM TO NEC 2020  
8. 2023 FBC RESIDENTIAL 8th EDITION APSP13  
9. CONCRETE STAIRS ARE 12" TREAD WIDTH AND 10" MAXIMUM HEIGHT  
10. ALL CONSTRUCTION SHALL COMPLY WITH ANSI 5-03, 2020 NEC ARTICLE 680, & ANSI-NSPI 3-99 IN-GROUND SPA CONSTR.  
  
\*11. ENGINEERS DESIGN IS FOR STRUCTURAL ONLY. DESIGN OF PIPING/EQUIPMENT ETC.  
  
BY POOL CONTRACTOR  
FENCE REQUIREMENTS:  
1. MINIMUM 48" HEIGHT  
2. 2" MAX VERTICAL CLEARANCE BETWEEN GRADE & BARRIER BOTTOM.  
3. MAX OPENING SHALL NOT ALLOW PASSAGE OF 4" SPHERE.  
4. FENCE POSTS WILL BE LOCATED ON POOL-SIDE OF FENCE.  
5. GATE WILL BE SELF-LOCKING WITH APPROVED LOCKING DEVICE.



FLOOR SLOPE DETAIL NTS



SKIMMER OPENING DETAIL

Riddle Consulting Engineers, Inc.

structural  
civil  
mechanical

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PAUL D RIDDLE

LICENSE

No. 36989

STATE OF

FLORIDA

PROFESSIONAL ENGINEER

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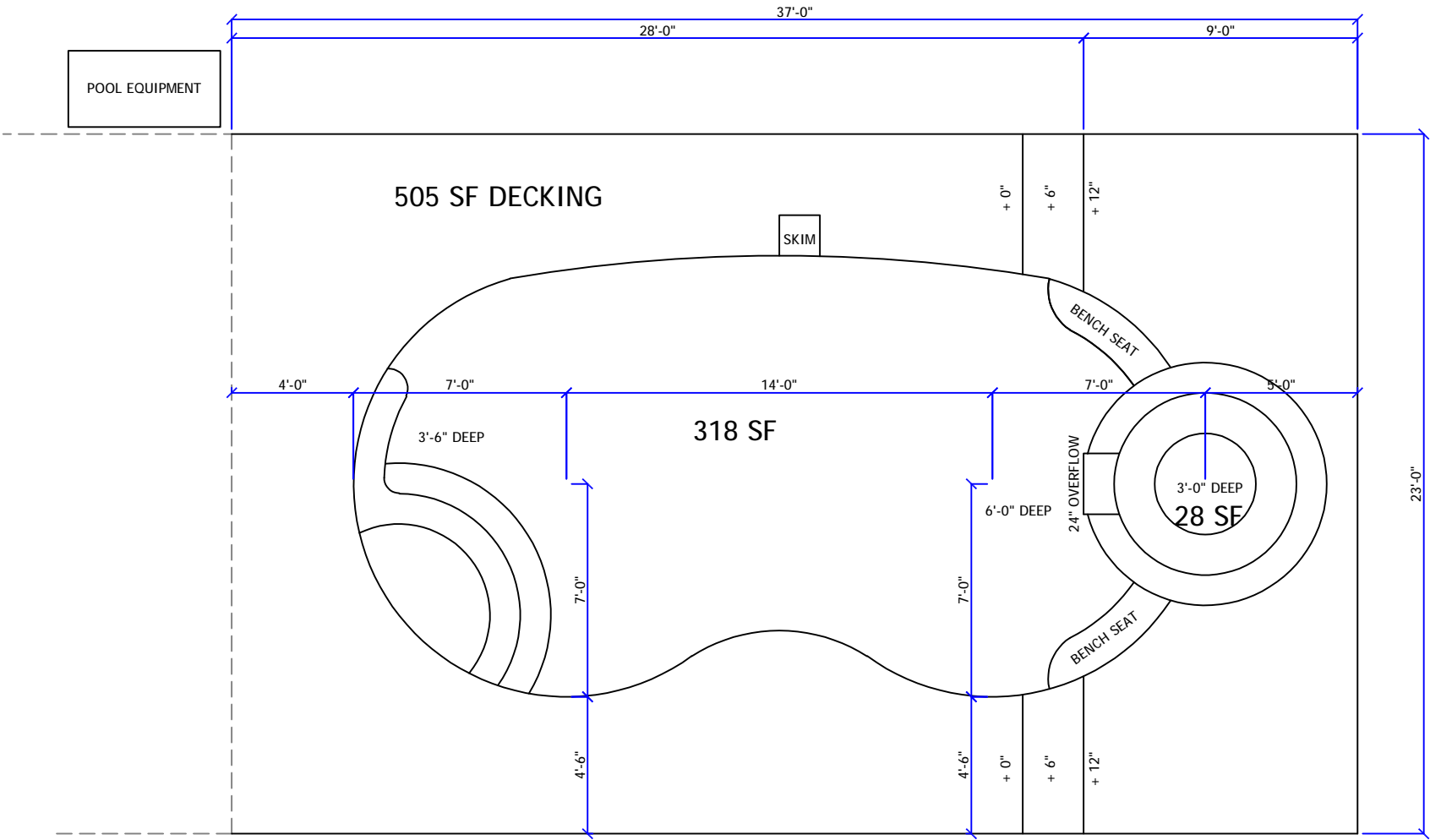
DATEDec. 5, 24

A CUSTOM DESIGN FOR  
THE LIGATO RESIDENCE  
AQUATIC ART

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3/16" = 1'-0" SCALE



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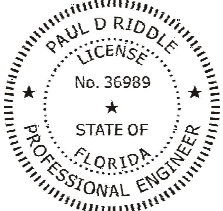


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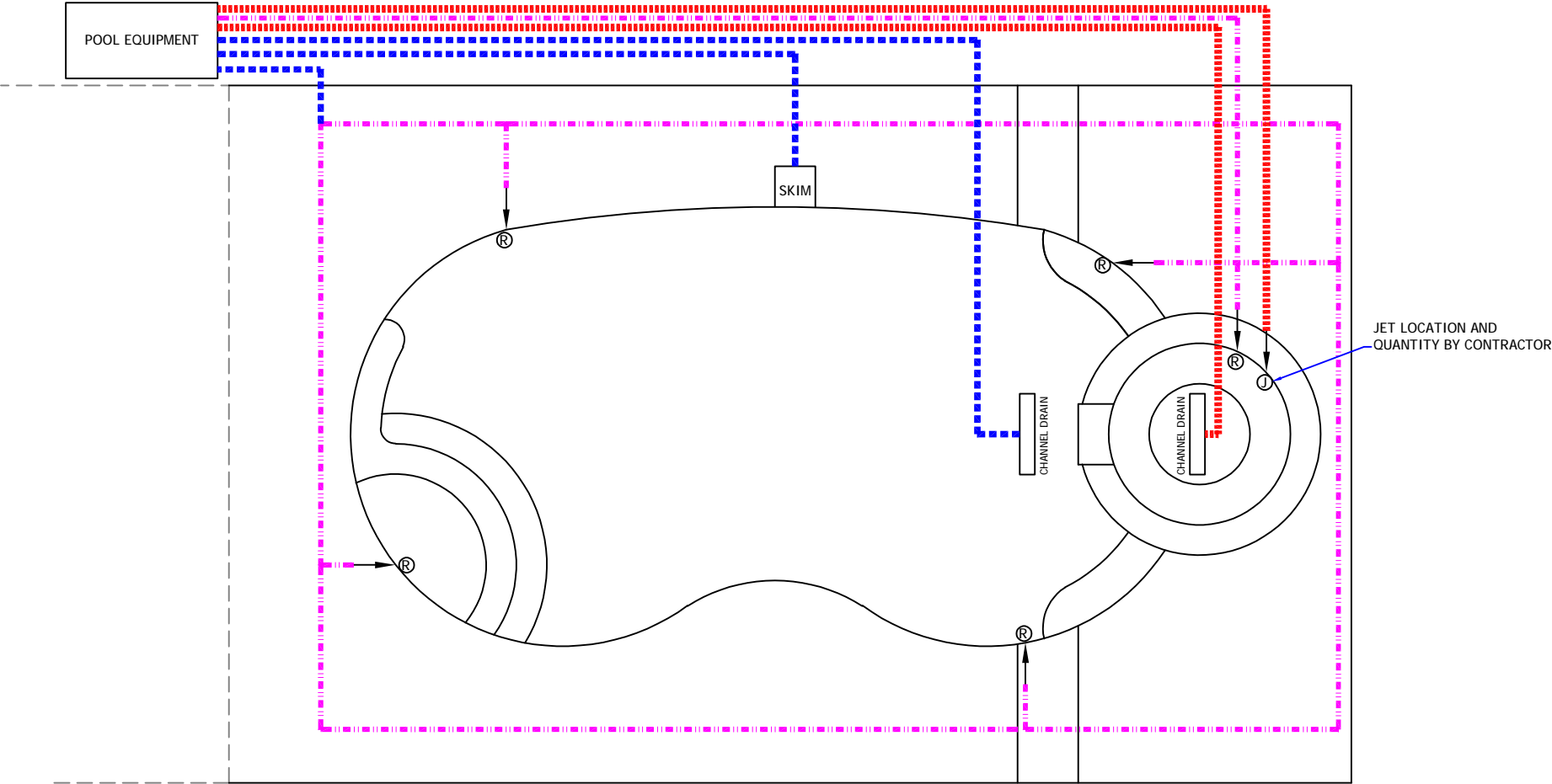


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# PIPING KEY

- 2" Ø LINE
- 2.5" Ø LINE
- 3" Ø LINE

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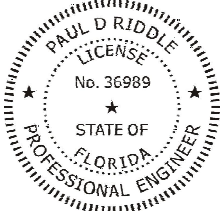


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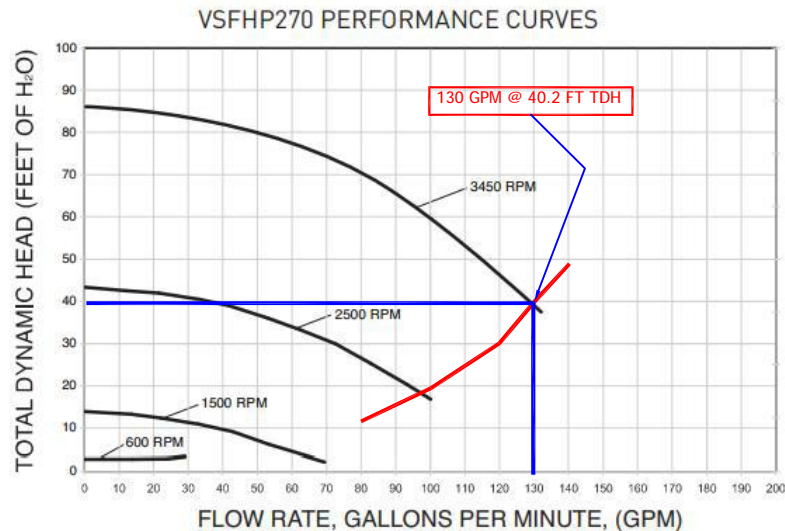
3/16" = 1'-0" SCALE



SPECIFICATIONS

Model No.	Total Horse-power	Voltage	Max Watts	Recommended Pipe Size¹	Carton Weight	Overall Length
VSFHP270JEP	2.7	208-230 VAC	2,400 W	2½-3"	56.0 lbs	27¾"
VSFHP270AUT⁵	2.70	208-230 VAC	2,400 W	2½-3"	56.0 lbs	27¾"

PERFORMANCE

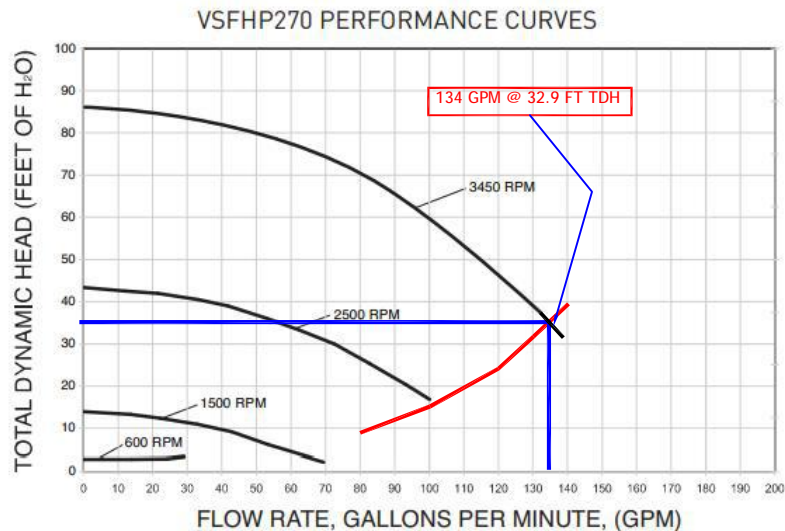


POOL PUMP VS. SYSTEM CURVE

SPECIFICATIONS

Model No.	Total Horse-power	Voltage	Max Watts	Recommended Pipe Size¹	Carton Weight	Overall Length
VSFHP270JEP	2.7	208-230 VAC	2,400 W	2½-3"	56.0 lbs	27¾"
VSFHP270AUT⁵	2.70	208-230 VAC	2,400 W	2½-3"	56.0 lbs	27¾"

PERFORMANCE



SPA PUMP VS. SYSTEM CURVE

<b>AQUATIC</b> 12/5/2024	<b>LIGATO</b> *****
MINIMUM FLOW REQ'D = 55.38 GPM	
POOL VOLUME : SURFACE AREA X AVG DEPTH X 7.48 GAL / CF	
VOL = 318 SF X 4.78 FT DEEP = 11298.54 Gallons	
TURNOVER TIME: 6 hours x 60 = 360 minutes	
MAX POOL FLOW RATE: GALLONS / TURNOVER = FLOW RATE	
11298.54 GAL / 360 minutes = 31.3848333 GPM	
POOL FEATURES	
JETS, SHEER DOWN WATER FEATURE GPM EA = 25 GPM	
TOTAL SUGGESTED POOL FLOW RATE: 55.38 GPM	
V = 1.318 C R <sup>0.63</sup> S <sup>1.48</sup>	
<b>SUPPLY (RETURN) PIPING</b>	<b>SUCTION PIPING</b>
2.5 in = NOMINAL DIAMETER	2.5 in = NOMINAL DIAMETER
2.45 in = D ACTUAL diam	2.45 in = D ACTUAL diam
0.2038 ft = D diam	0.2038 ft = D diam
140 = C, coefficient of roughness	140 = C, coefficient of roughness
4.6951 in² = A pipe	4.6951 in² = A pipe
0.0326 ft² = A pipe	0.0326 ft² = A pipe
130.00 gpm / line 0.2896613 cfs	65.00 gpm = 0.1448307 cfs
130.00 gpm = TOTAL FLOW IN 1 LINES	No of Suction Pipes
0.2897 cfs = Q flow M	0.1448 cfs = Q flow rate
8.8839 f/sec = V = Velocity	4.4420 f/sec = V = Velocity
0.0509 ft = R = Hydraulic Radius = A / P	0.0509 ft = R = Hydraulic Radius = A / P
0.1172 f/ft = S hydraulic gradient	0.0325 f/ft = S hydraulic gradient
5 ft = pipe length average	5 ft = pipe length average
0.59 ft = hf = head loss due to friction	1.01 ft = hf = head loss due to friction
0.25 psi 0.0025358	0.44 psi 0.0043555
<b>BRANCH Pmodel</b>	<b>FLOW STR FT PSI</b>
2 in @ 6 fps max BRANCH = 61.54 GPM	80.00 12.4 5.37
2 in @ 8 fps max TRUNK = 82.06 GPM	100.00 19.3 8.35
2 in @ 10 fps max RETURN = 102.57 GPM	120.00 29.9 12.94
3 in @ 3 fps max RETURN = 67.95 GPM MAIN	130.00 40.2 17.40
	DRAIN 140.00 48.2 20.87
<b>OTHER PRESSURE LOSSES</b> per mfdg	
11.00 FT = FILTER TDH LOSS	JANDY PRO SERIES CS150-250 CARTRIDGE FILTER
12.40 FT = HEATER TDH LOSS	JANDY PRO SERIES by Zodiac GAS HEATER MODEL 400
23.40 FT = TOTAL TDH LOSS	
<b>MINOR LOSSES (SUPPLY &amp; SUCTION COMBINED)</b>	
h (lost) = KL * V² / (2*g)	K h (lost) ft
2 ea = # tees thru side outlet	1.75 4.29
2 ea = # gate valves	1 2.45
1 ea = # check valves	0.25 0.25
0 THERAPY JET	21.73 0.00
0 ea = # 45 deg ELL	0.4 0.00
6 ea = # 90 deg ELL	0.75 5.51
0 ea = Reducer D2=	0.5 0.0871791 0.00 D1/D2= 4.89
	<b>TOTAL = 12.50 ft</b>
<b>ELEVATION DIFFERENCE</b>	
0.00 ft = delta Z	
model	
<b>2.68 FT = TOTAL FRICTION HEAD LOSS AFTER SPLIT @ LOOP</b>	
<b>40.17 FT = TOTAL HEAD LOSS IN SYSTEM @ 130.00 GPM</b>	
17.39 PSI	
PUMP SELECTION : JANDY VSPHP270AUT	
model: VARIABLE SPEED	
SUCTION OUTLET COVER: MUST EXCEED 130.00 GPM FLOW RATE	
model 32" CHANNEL DRAIN OR 2 OUTLET COVERS	O.K.
SYSTEM FLOW RATE MUST NOT EXCEED APPROVED COVER FLOW RATE	
PER FBC 2023 8TH EDITION ANSI / APSP 13	
MOTOR TO BE GFCI PROTECTED PER NEC 680.21®	

<b>AQUATIC</b> 12/5/2024	<b>LIGATO SPA</b> *****
MINIMUM FLOW REQ'D = 131.75 GPM	
POOL VOLUME : SURFACE AREA X AVG DEPTH X 7.48 GAL / CF	
VOL = 29 SF X 8.78 FT DEEP = 628.32 Gallons	
TURNOVER TIME: 6 hours x 60 = 360 minutes	
MAX POOL FLOW RATE: GALLONS / TURNOVER = FLOW RATE	
628.32 GAL / 360 minutes = 1.74533333 GPM	
POOL FEATURES	
JETS, SHEER DOWN WATER FEATURE GPM EA = 120 GPM	
TOTAL SUGGESTED POOL FLOW RATE: 131.75 GPM	
V = 1.318 C R <sup>0.63</sup> S <sup>1.48</sup>	
<b>SUPPLY (RETURN) PIPING</b>	<b>SUCTION PIPING</b>
3 in = NOMINAL DIAMETER	3 in = NOMINAL DIAMETER
3.04 in = D ACTUAL diam	3.04 in = D ACTUAL diam
0.2535 ft = D diam	0.2535 ft = D diam
140 = C, coefficient of roughness	140 = C, coefficient of roughness
7.2679 in² = A pipe	7.2679 in² = A pipe
0.0505 ft² = A pipe	0.0505 ft² = A pipe
134.00 gpm / line 0.298574 cfs	134.00 gpm = 0.298574 cfs
134.00 gpm = TOTAL FLOW IN 1 LINES	No of Suction Pipes
0.2986 cfs = Q flow M	0.2986 cfs = Q flow rate
5.9157 f/sec = V = Velocity	5.9157 f/sec = V = Velocity
0.0634 ft = R = Hydraulic Radius = A / P	0.0634 ft = R = Hydraulic Radius = A / P
0.0428 f/ft = S hydraulic gradient	0.0428 f/ft = S hydraulic gradient
5 ft = pipe length average	5 ft = pipe length average
1.97 ft = hf = head loss due to friction	1.97 ft = hf = head loss due to friction
0.85 psi 0.0085148	0.85 psi 0.0085148
<b>BRANCH Pmodel</b>	<b>FLOW STR FT PSI</b>
2 in @ 6 fps max BRANCH = 61.54 GPM	80.00 9.5 4.11
2 in @ 8 fps max TRUNK = 82.06 GPM	100.00 14.7 6.36
2 in @ 10 fps max RETURN = 102.57 GPM	120.00 23.3 10.09
3 in @ 3 fps max RETURN = 67.95 GPM MAIN	130.00 32.3 13.98
	DRAIN 140.00 39.1 16.93
<b>OTHER PRESSURE LOSSES</b> per mfdg	
11.00 FT = FILTER TDH LOSS	JANDY PRO SERIES CS150-250 CARTRIDGE FILTER
12.40 FT = HEATER TDH LOSS	JANDY PRO SERIES by Zodiac GAS HEATER MODEL 400
23.40 FT = TOTAL TDH LOSS	
<b>MINOR LOSSES (SUPPLY &amp; SUCTION COMBINED)</b>	
h (lost) = KL * V² / (2*g)	K h (lost) ft
2 ea = # tees thru side outlet	1.75 1.90
2 ea = # gate valves	1 1.09
1 ea = # check valves	0.2 0.11
0 THERAPY JET	21.73 0.00
0 ea = # 45 deg ELL	0.4 0.00
6 ea = # 90 deg ELL	0.75 2.45
0 ea = Reducer D2=	0.5 0.0871791 0.00 D1/D2= 6.084
	<b>TOTAL = 5.54 ft</b>
<b>ELEVATION DIFFERENCE</b>	
0.00 ft = delta Z	
model	
<b>0.00 FT = TOTAL FRICTION HEAD LOSS AFTER SPLIT @ LOOP</b>	NA
<b>32.88 FT = TOTAL HEAD LOSS IN SYSTEM @ 134.00 GPM</b>	
14.23 PSI	
PUMP SELECTION : JANDY VSPHP270AUT	
model: VARIABLE SPEED	
SUCTION OUTLET COVER: MUST EXCEED 134.00 GPM FLOW RATE	
model 32" CHANNEL DRAIN OR 2 OUTLET COVERS	O.K.
SYSTEM FLOW RATE MUST NOT EXCEED APPROVED COVER FLOW RATE	
PER FBC 2023 8TH EDITION ANSI / APSP 13	
MOTOR TO BE GFCI PROTECTED PER NEC 680.21®	

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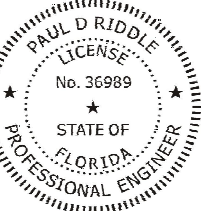


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