

RICK'S OVERBALANCE WATER WHEEL TORQUE CALCULATOR

To use, simply enter in (at column B, row 14) the scaled drawing measurement, in millimeters, of the distance from the center point of water fill weight in any tube to the vertical centerline of the water wheel. The current default value of 132mm at startup represents my measure for tube A taken while viewing the water wheel diagram using a 200% zoom-in level. Measurements for the remaining tubes are as follows: B=140mm, C=111mm, D=46mm, E=27mm, F=93.5mm, G=5.5mm, H=35.5mm, I=60mm, J=65mm, K=54.5, L=29mm. Refer to the file "dodecagon wheel figure 5.jpg" to take your own measurements, and for the letters assigned to each tube.

Note: See sheet 2 of this **Water Fill Weight Calcul** how the water fill weight and which also allows ex different water fill height more or less water fill we

Tube size	millimeters	inches	feet	lbs water fill weight	ft-lbs torque
3"	29	7.15	0.596	5.000	2.980
4"	29	9.54	0.795	11.477	9.124
6"	29	14.31	1.193	39.079	46.621
8"	29	19.08	1.590	90.205	143.426
10"	29	23.85	1.988	177.731	353.329
12"	29	28.63	2.386	302.817	722.521

Torque specifications per tube size

	3" Tube	4" Tube	6" Tube	8" Tube	10" Tube
Tube A	13.565	41.524	212.082	652.814	1607.755
Tube B	14.390	44.037	224.939	692.414	1705.151
Tube C	11.410	34.913	178.317	548.988	1352.000
<u>Tube D</u>	<u>4.730</u>	<u>14.472</u>	<u>73.898</u>	<u>227.497</u>	<u>560.386</u>
Totals	44.095	134.946	689.236	2121.713	5225.292
Tube E	2.775	8.493	43.378	133.503	328.802
Tube F	9.610	29.416	150.220	462.391	1138.900
Tube G	0.565	1.733	8.832	27.242	67.005
Tube H	3.650	11.167	57.016	175.629	432.420
Tube I	6.165	18.868	96.408	296.684	730.830
Tube J	6.680	20.441	104.458	321.400	791.614
Tube K	5.600	17.135	87.576	269.533	663.825
<u>Tube L</u>	<u>2.980</u>	<u>9.124</u>	<u>46.621</u>	<u>143.426</u>	<u>353.329</u>
Totals	38.025	116.377	594.509	1829.808	4506.725

A [

B [

Rotational torque per tube size (in foot-pounds)

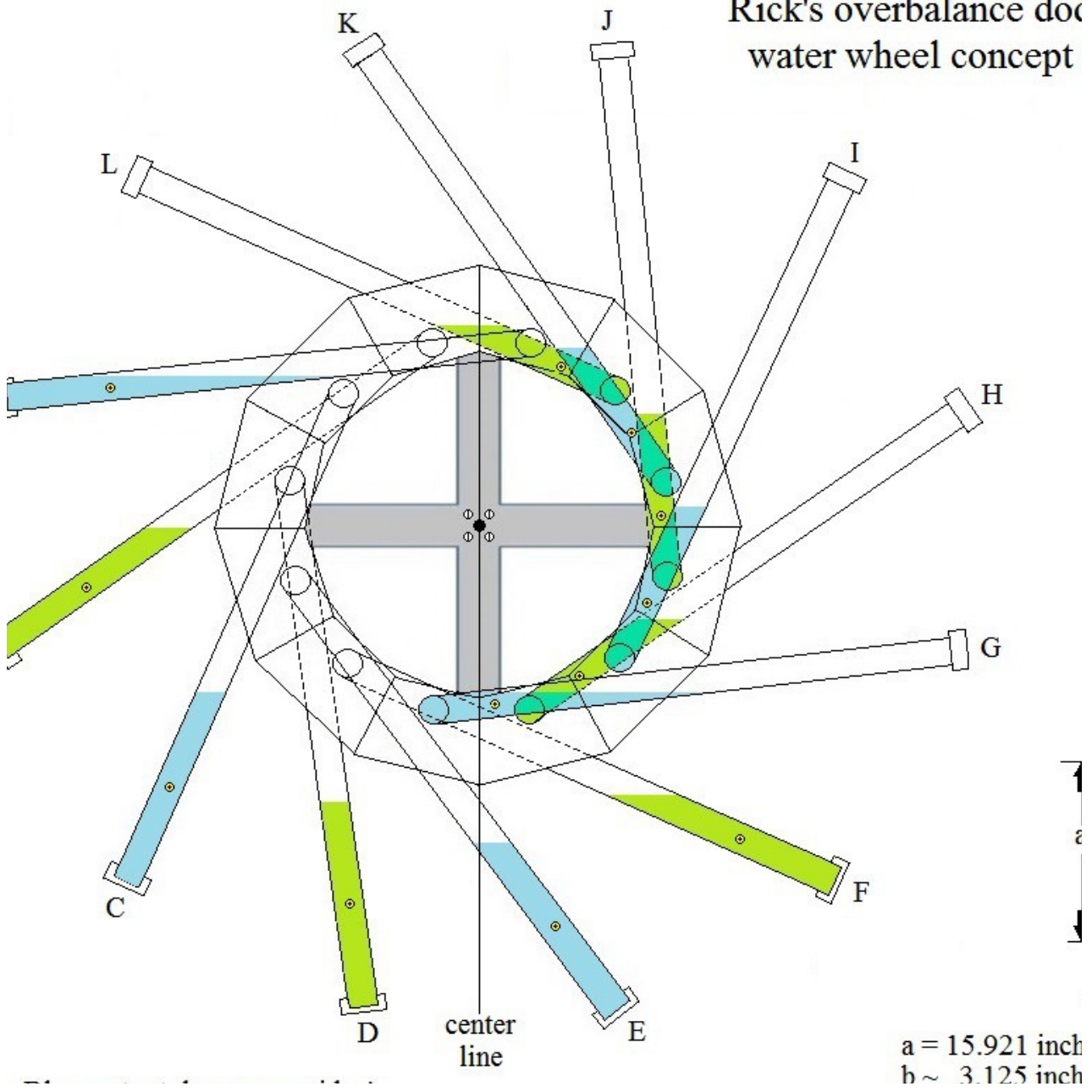
3" Tube	4" Tube	6" Tube	8" Tube	10" Tube
6.070	18.569	94.727	291.905	718.567

Percentage of overbalance condition at left half of water wheel (tubes A through D)

15.96%	15.96%	15.93%	15.95%	15.94%
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spreadsheet for a **ator** which shows
 is were calculated,
 perimenting with
 is that would yield
 eight.

Rick's overbalance doc
 water wheel concept

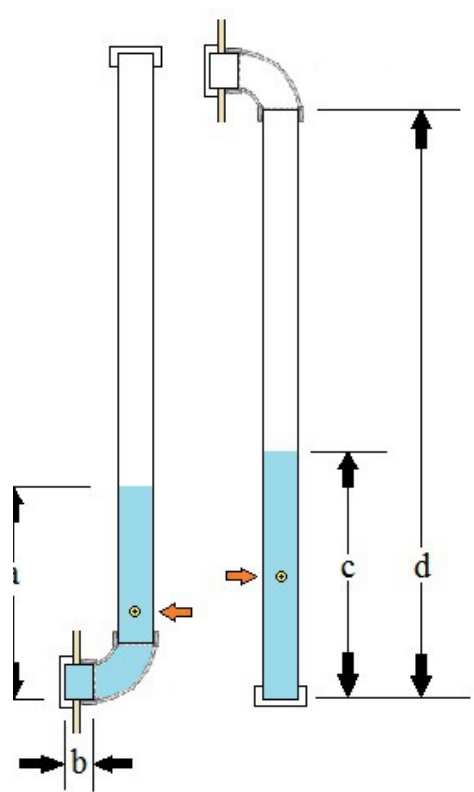
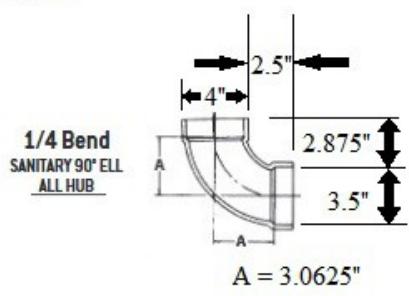


Blue water tubes are on side A
Green water tubes are on side B
Blue/Green shows tube overlays

Richhoff

$c = 18.6577$ in
 $d = 44.0266$ in
elbow = 3 inch,
→ ⊕ = mid pc
Note: All dime
Schedule 40 P

leacagon design



ies water fill height (5 pounds)
ies short nine length

... show pipe length
ches water fill height (5 pounds)
ches long pipe length
, 1/4 bend sanitary elbow
oint of water fill weight
nsions shown are for 3 inch
VC DWV pipe.

Rick's Overbalance Water Wheel Water Fill Weight Calculator

notes:

1. Inside cross-sectional area of pipe = $3.1416 \times (\text{Pipe I.D.} / 2)^2$
2. Cubic inches water volume = area in square inches x inches of fill height
3. Weight of water fill in pounds (lbs) = cubic inches x .03625
4. I arrived at an even weight of 5 lbs for the 3" pipe size by assuming that I would want the pipe to be about half filled with water, and then calculating the fill height nearest that which would give me a whole number. This turned out to be 18.6577, but one could experiment with different water weights by entering a different fill height in the highlighted column E, row 15 data position below.

Pipe size	Pipe O.D	Pipe I.D.	Area sq in	Fill height inches	Cubic inches	lbs weight
3"	3.5	3.068	7.3927	18.6577	137.931	5.000
4"	4.5	4.026	12.7303	24.8707	316.611	11.477
6"	6.625	6.065	28.8903	37.3154	1078.053	39.079
8"	8.625	7.981	50.0271	49.7414	2488.418	90.205
10"	10.75	10.02	78.8545	62.1768	4902.920	177.731
12"	12.75	11.938	111.9319	74.6308	8353.567	302.817

Note: If the fill height is altered, this will affect the center point of fill weight within a tube. For example, if the fill height is raised one inch, the center point of fill weight will be raised 1/2 inch, which equals 12.7 millimeters. Thus, the center points shown in the drawing in sheet #1 would all have to be reconfigured by moving each of them accordingly, and new measurements would have to be taken from each of the revised center points to the water wheel's vertical centerline to determine the correct measurement to be entered at column B14 of Sheet #1.