Pontoon Float or Boat Draft Calculation

This calculator assumes that a pontoon float or boat consists of two or more pontoons tied together by some form of structure, which is decked over to form a platform for people and gear.

Assumptions:

$D_{pontoon} := 24in$ *Diameter of the pontoon* $L_{platform} := 24ft$ *Length of platform on top of pontoons*

$L_{pontoon} := 25ft$ *Length of the pontoon* $W_{platform} := 10ft$ *Width of platform on top of pontoons*

$N_{pontoon} := 2$ *Total number of pontoons* $LL := 25\dfrac{lbf}{ft^2}$ *Typical design weight of people and gear on float*

$\gamma_{pontoon} := 47.86\dfrac{lbf}{ft}$ *Unit weight of the pontoon*

$DL_{other} := 500lbf$ *Weight of platform, hardware, etc.* $\gamma_{water} := 62.4\dfrac{lbf}{ft^3}$ *Unit Weight of water Fresh: 62.4 Salt: 64*

Calculations:

$DL_{vessel} := \gamma_{pontoon} \cdot L_{pontoon} \cdot N_{pontoon} + DL_{other}$ *Total weight of the pontoon boat (unloaded)*

$LL_{vessel} := LL \cdot L_{platform} \cdot W_{platform}$ *Weight of people and gear on pontoon boat*

$DL_{Vol} := \dfrac{DL_{vessel}}{\gamma_{water}}$ *Volume of water displaced by just the pontoon boat weight*

$LL_{Vol} := \dfrac{DL_{vessel} + LL_{vessel}}{\gamma_{water}}$ *Volume of water displaced by pontoon boat + peaple + gear*

$DL_{Area} := \dfrac{DL_{Vol}}{N_{pontoon} \cdot L_{pontoon}}$ *End area of submerged pontoon, pontoon boat weight*

$LL_{Area} := \dfrac{LL_{Vol}}{N_{pontoon} \cdot L_{pontoon}}$ *End area of submerged pontoon, pontoon boat weight + peaple + gear*

In this next section, we need to use calculated values to pick values from a table. Table is attached at the end of this worksheet.

$inTable_{DL} := \dfrac{DL_{Area}}{D_{pontoon}^2}$

$inTable_{LL} := \dfrac{LL_{Area}}{D_{pontoon}^2}$

$\text{inTable}_{\text{DL}} = 0.232$ *Find this number in the table, under the column area/D^2. Pick the value of d/D from the column to the left of your value, and enter it below.*

$\text{inTable}_{\text{LL}} = 0.713$ *Find this number in the table, under the column area/D^2. Pick the value of d/D from the column to the left of your value, and enter it below.*

$\text{outTable}_{\text{DL}} := 0.34$ *This is the number you picked off the table, in the d/D column and from the same row as the value for inTable $_{DL}$*

$\text{outTable}_{\text{LL}} := 0.86$ *This is the number you picked off the table, in the d/D column and from the same row as the value for inTable $_{LL}$*

$d_{\text{DL}} := \text{outTable}_{\text{DL}} \cdot D_{\text{pontoon}}$ *Multiply the value found above by the pontoon diameter to find the submerged depth or draft of the pontoon boat under just it's own weight.*

$d_{\text{LL}} := \text{outTable}_{\text{LL}} \cdot D_{\text{pontoon}}$ *Multiply the value found above by the pontoon diameter to find the submerged depth or draft of the pontoon boat under just it's own weight.*
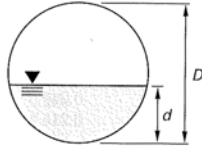
Results:

$d_{\text{DL}} = 8.16 \, \text{in}$ *Submerged depth or draft of the pontoon boat under just it's own weight.*

$d_{\text{LL}} = 20.64 \, \text{in}$ *Submerged depth or draft of the pontoon boat with passengers and gear.*

APPENDIX 16.A
Area, Wetted Perimeter, and Hydraulic Radius
of Partially Filled Circular Pipes

$\dfrac{d}{D}$	$\dfrac{\text{area}}{D^2}$		$\dfrac{d}{D}$	$\dfrac{\text{area}}{D^2}$
0.01	0.0013		0.51	0.4027
0.02	0.0037		0.52	0.4127
0.03	0.0069		0.53	0.4227
0.04	0.0105		0.54	0.4327
0.05	0.0147		0.55	0.4426
0.06	0.0192		0.56	0.4526
0.07	0.0242		0.57	0.4625
0.08	0.0294		0.58	0.4723
0.09	0.0350		0.59	0.4822
0.10	0.0409		0.60	0.4920
0.11	0.0470		0.61	0.5018
0.12	0.0534		0.62	0.5115
0.13	0.0600		0.63	0.5212
0.14	0.0688		0.64	0.5308
0.15	0.0739		0.65	0.5404
0.16	0.0811		0.66	0.5499
0.17	0.0885		0.67	0.5594
0.18	0.0961		0.68	0.5687
0.19	0.1039		0.69	0.5780
0.20	0.1118		0.70	0.5872
0.21	0.1199		0.71	0.5964
0.22	0.1281		0.72	0.6054
0.23	0.1365		0.73	0.6143
0.24	0.1449		0.74	0.6231
0.25	0.1535		0.75	0.6318
0.26	0.1623		0.76	0.6404
0.27	0.1711		0.77	0.6489
0.28	0.1800		0.78	0.6573
0.29	0.1890		0.79	0.6655
0.30	0.1982		0.80	0.6736
0.31	0.2074		0.81	0.6815
0.32	0.2167		0.82	0.6893
0.33	0.2260		0.83	0.6969
0.34	0.2355		0.84	0.7043
0.35	0.2450		0.85	0.7115
0.36	0.2546		0.86	0.7186
0.37	0.2642		0.87	0.7254
0.38	0.2739		0.88	0.7320
0.39	0.2836		0.89	0.7384
0.40	0.2934		0.90	0.7445
0.41	0.3032		0.91	0.7504
0.42	0.3130		0.92	0.7560
0.43	0.3229		0.93	0.7612
0.44	0.3328		0.94	0.7662
0.45	0.3428		0.95	0.7707
0.46	0.3527		0.96	0.7749
0.47	0.3627		0.97	0.7785
0.48	0.3727		0.98	0.7816
0.49	0.3827		0.99	0.7841
0.50	0.3927		1.00	0.7854