



**REV 3/27/2018

CALCULATING BALLAST NEEDS

ASSUMPTIONS: FULLY SATURATED SOIL SURROUNDS THE ENTIRE STATION
 STATION IS EMPTY AND WE ALLOW NO CREDIT FOR WASTEWATER
 WE DO NOT ALLOW FOR SOIL FORCE ON RIBS OF TANK. ASSUMED SMOOTH WALL TANK.

STANDARDS: UPLIFT FORCE OR DENSITY OF WATER = 62.4 LB/CUBIC FOOT.
 CONCRETE DENSITY IN AIR = 150 LB/CUBIC FOOT
 CONCRETE DENSITY IN WATER = 87.6 LB/CUBIC FOOT OR NET BENEFIT IN WATER
 SATURATED SOIL DENSITY = 70 LB/CUBIC FOOT OR NET BENEFIT

CALCULATE THE TANK VOLUME IN CUBIC FEET THAT WILL BE BURIED. AREA OF THE CIRCLE TIMES THE HEIGHT = VOLUME OF THE CYLINDER.
 THIS DISPLACED VOLUME IS THE AMOUNT OF WATER THAT MAY BE DISPLACED RESULTING IN UPLIFT FORCE AGAINST THE PUMP CHAMBER
 DEDUCTING FOR THE TANK WEIGHT LEAVES THE WEIGHT OF BALLAST REQUIRED TO SECURE THE PUMP CHAMBER.

PUMP MODEL	STATION HEIGHT			DIAMETER		STATION WEIGHT	TANK VOL. CUBIC FT.	STATION DENSITY	UPLIFT FORCE WATER
	INCHES	BURIED	FEET	INCHES	FEET				
DH071-61	60.40	57.40	4.78	26.40	2.20	241	21.44	11.24	-1337.76
DH071-74	73.00	70.00	5.83	26.40	2.20	254	25.43	9.99	-1586.82
DH071-93	91.80	88.80	7.40	26.40	2.20	270	31.39	8.60	-1958.44
DH071-124	123.30	120.30	10.03	26.40	2.20	280	41.36	6.77	-2581.10
DH071-129	127.90	124.90	10.41	26.40	2.20	300	42.82	7.01	-2672.03
DH071-158	157.80	154.80	12.90	26.40	2.20	325	52.29	6.22	-3263.06
DH071-160	159.20	156.20	13.02	26.40	2.20	329	52.74	6.24	-3290.73

BALLAST NEEDS WILL BE ACHIEVED BY ADDING WEIGHT FROM A CONCRETE BALLAST, PLUS WEIGHT OF SOIL TO BE PLACED ON TOP OF BALLAST.

BAL-LAST PROVIDES A STRUCTURAL BOND TO THE PUMP CHAMBER THAT LOOSE CONCRETE DOES NOT

VOLUME OF THE RING IS BASED ON A RING DIAMETER OF 36.5 INCHES = 3.04 FEET. RING HEIGHT IS 11.3 INCHES = 0.94 FEET

THE RING IS HOLLOW IN THE CENTER SPACE USED BY THE PUMP CHAMBER AND MUST BE DEDUCTED FROM THE VOLUME OF THE CONCRETE RING.

AREA OF THE CONCRTE RING = AREA 1	7.26 SQUARE FEET	$AREA = ((3.1416 * (DIAM.*DIAM))/4)$
AREA OF THE PUMP CHAMBER - AREA 2	3.80 SQUARE FEET	
NET AREA OF BALLAST RING	3.46 SQUARE FEET	
VOLUME OF RING = HEIGHT TIMES THE AREA	3.26 CUBIC FEET DISPLACED BY RING	** (Is added to tank volume above)
WEIGHT OF BAL-LAST RING WITH CONCRETE	375.00 POUNDS IN AIR (BASED ON STRUCTURAL TESTING)	

SOIL COLUMN ADDED IS EQUAL TO SOIL AREA 3.46 SQUARE FEET
 MULTIPLY BY THE HEIGHT OF THE BURIED SOIL ADJUSTED FOR THE BAL-LAST RING HEIGHT

THE SOIL HEIGHT IS VARIABLE FOR EACH STATION MODEL NOTED ABOVE. SEE **TABLE 2** FOR FINAL CONDITION WITH BACKFILLED SOIL

CALCULATING BALLAST NEEDS



TABLE 2

PUMP MODEL	STATION BURIED	SOIL COLUMN	SOIL VOLUME	SOIL WEIGHT	BAL-LAST WEIGHT	STATION WEIGHT	COMBINED WEIGHT	UPLIFT FORCE WATER	FINAL CONDITION	Margin of Safety
DH071-61	4.78	3.84	13.29	930.05	375	241	1546.05	-1337.76	208.30	116%
DH071-74	5.83	4.89	16.92	1184.14	375	254	1813.14	-1586.82	226.32	114%
DH071-93	7.40	6.46	22.33	1563.26	375	270	2208.26	-1958.44	249.82	113%
DH071-124	10.03	9.09	31.41	2198.49	375	280	2853.49	-2581.10	272.39	111%
DH071-129	10.41	9.47	32.73	2291.25	375	300	2966.25	-2672.03	294.23	111%
DH071-158	12.90	11.96	41.35	2894.21	375	325	3594.21	-3263.06	331.16	110%
DH071-160	13.02	12.08	41.75	2922.45	375	329	3626.45	-3290.73	335.72	110%

SOIL COLUMN IS THE BURIED DEPTH LESS THE DISPLACED SOIL FROM THE BAL-LAST RING.
 CALCULATING THE SOIL WEIGHT AND COMBINING WITH THE PUMP AND BALLAST RING WE GET THE COMBINED WEIGHT
 SUBSTRACT THE UPLIFT FORCE FROM THE TOTAL STATION WEIGHT TO GET THE FINAL CONDITION
TABLE 2 SHOWS THAT ALL STATIONS WILL NOT FLOAT WITH ONE RING OF BAL-LAST AND BACKFILLED SOIL.

BAL-LAST PROVIDES A FULL STRUCTURAL BLOCK ASSEMBLY THAT TRANSFERS THE LOADS EVENLY AROUND THE PUMP BASE

IMPORTANT NOTE:

Page 5 of ENVIRONMENT ONE MODEL DH071 INSTRUCTIONS CLEARLY STATES THE FOLLOWING:

" The concrete anchor is not optional. (See Chart 1 on page 12 for specific requirements for your unit)"

For more information visit

www.interlockingballast.com