



GeoHeader® Data Sheet

GHP Systems, Inc.
1000 32nd Ave
Brookings, SD 57006

(605) 697-7869 tel
(605) 697-9118 fax
888-447-7757 toll-free
www.ghpsystems.com

VHE Circuit Sizing Table (Water)

VERTICAL HEAT EXCHANGER (VHE)				2" Circuit Pipe			3" Circuit Pipe			4" Circuit Pipe		
Pipe Size (IPS DR11)	Flow Rate (GPM)	Reynolds Number	Hd Loss (ft hd/100')	Optm # VHEs	S/R Hd Loss (ft hd/100')	Flush/Purge (GPM)	Optm # VHEs	S/R Hd Loss (ft hd/100')	Flush/Purge (GPM)	Optm # VHEs	S/R Hd Loss (ft hd/100')	Flush/Purge (GPM)
3/4	2.0	4739	1.02	17	2.91	62	58	3.00	210	115	3.06	416
	2.5	5923	1.49	13	2.69	47	46	2.95	167	91	3.00	329
	3.0	7108	2.04	11	2.76	40	39	3.04	141	76	3.01	275
	3.5	8293	2.65	10	3.06	36	33	2.97	136	65	3.00	269
	4.0	9477	3.34	9	3.22	41	29	3.00	132	57	3.01	259
1	3.5	6622	0.92	10	3.06	57	33	2.97	187	65	3.00	368
	4.0	7568	1.15	9	3.22	51	29	3.00	164	57	3.01	323
	4.5	8513	1.41	8	3.22	45	26	3.04	147	51	3.05	289
	5.0	9459	1.69	7	3.06	40	23	2.95	131	46	3.06	262
	5.5	10405	2.00	6	2.76	34	21	2.97	137	41	4.22	267
	6.0	11351	2.32	6	3.22	37	19	2.90	124	38	3.01	247
	6.5	12297	2.67	5	2.69	31	18	3.04	136	35	1.81	265
	7.0	13243	3.03	5	3.06	31	17	3.14	129	32	2.92	243
1 1/4	6.0	8992	0.77	5	3.22	45	19	2.90	172	38	3.01	344
	7.0	10491	1.01	5	3.06	45	16	2.81	145	32	2.02	290
	8.0	11990	1.27	4	2.62	36	14	2.81	127	28	2.92	255
	9.0	13488	1.56	4	3.22	36	13	3.04	118	25	2.94	228
	10.0	14987	1.87	3	2.33	27	12	3.18	137	23	3.06	262
	11.0	16486	2.21	3	2.76	28	11	3.23	125	21	3.09	239
	12.0	17984	2.57	3	3.22	28	10	3.18	114	19	3.01	216
	13.0	19483	2.95	2	1.81	19	9	3.04	137	17	2.85	258
14.0	20982	3.36	2	2.07	19	8	2.81	121	16	2.92	243	

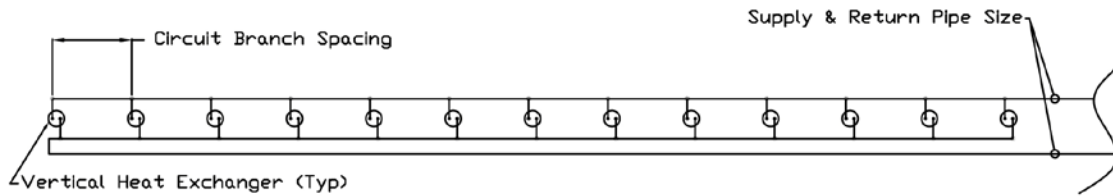
VHE Circuit Sizing Table (25% Propylene Glycol @ 30°F)

VERTICAL HEAT EXCHANGER (VHE)				2" Circuit Pipe			3" Circuit Pipe			4" Circuit Pipe		
Pipe Size (IPS DR11)	Flow Rate (GPM)	Reynolds Number	Hd Loss (ft hd/100')	Optm # VHEs	S/R Hd Loss (ft hd/100')	Flush/Purge (GPM)	Optm # VHEs	S/R Hd Loss (ft hd/100')	Flush/Purge (GPM)	Optm # VHEs	S/R Hd Loss (ft hd/100')	Flush/Purge (GPM)
3/4	2.0	1350	1.31	14	2.98	51	48	2.99	174	95	3.00	344
	2.5	1688	1.64	11	2.89	40	38	2.94	144	76	3.00	288
	3.0	2026	3.16	9	2.80	33	32	2.99	146	63	2.97	287
	3.5	2363	4.08	8	2.98	36	27	2.91	136	54	2.97	273
	4.0	2701	5.09	7	2.98	32	24	2.99	137	47	2.94	267
1	3.5	1887	0.93	8	2.98	45	27	2.91	153	54	2.97	306
	4.0	2157	1.78	7	2.98	40	24	2.99	137	48	3.05	273
	4.5	2426	2.17	6	2.80	34	21	2.91	137	42	2.97	273
	5.0	2696	2.58	5	2.45	28	19	2.94	124	39	3.14	254
	5.5	2965	3.03	5	2.89	31	17	2.86	129	35	3.07	265
	6.0	3235	3.50	5	3.35	31	16	2.99	121	32	3.05	243
	6.5	3504	4.01	4	2.62	25	15	3.07	137	29	2.96	264
	7.0	3774	4.54	4	2.98	25	14	3.10	127	27	2.97	246
1 1/4	6.0	4044	5.10	4	3.35	25	13	3.07	118	25	2.93	228
	6.0	2563	1.18	4	2.29	36	16	2.99	146	32	3.05	291
	7.0	2990	1.53	4	2.98	36	14	3.10	127	27	2.97	246
	8.0	3417	1.91	3	2.29	27	12	2.99	137	24	3.05	273
	9.0	3844	2.33	3	2.80	28	11	3.16	125	21	2.97	239
	10.0	4271	2.78	3	3.35	28	10	3.21	114	19	3.00	216
	11.0	4698	3.26	2	1.97	19	9	3.16	102	17	2.91	193
	12.0	5125	3.78	2	2.29	19	8	2.99	91	16	3.05	182
1 1/4	13.0	5552	4.33	2	2.62	19	7	2.72	106	15	3.14	228
	14.0	5979	4.92	2	2.98	19	7	3.10	106	14	3.17	212

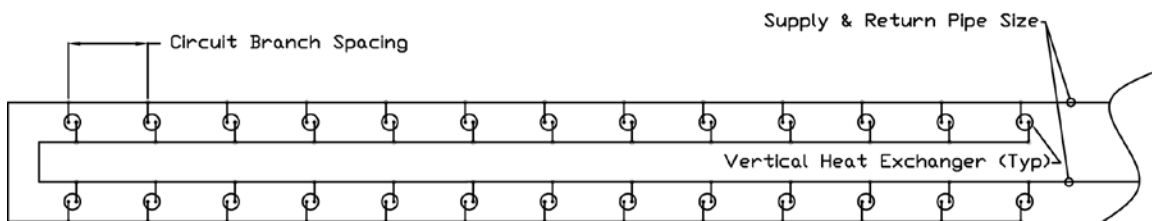
Pipe material is IPS high density polyethylene (HDPE) pipe. The pipe pressure ratings are DR11 (160 psi) for 2" pipe and smaller and DR15.5 (110 psi) for 3" and larger pipe. The data on the table above is based on approximately 3 feet of head loss per 100' of pipe for the supply/return header (circuit) piping. See back page of this data sheet for an explanation of data sheet tables.

Circuit Header Design Detail Drawings

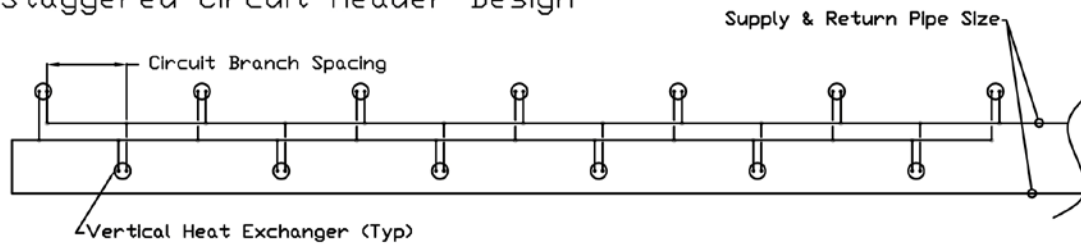
Standard Linear Circuit Header Design



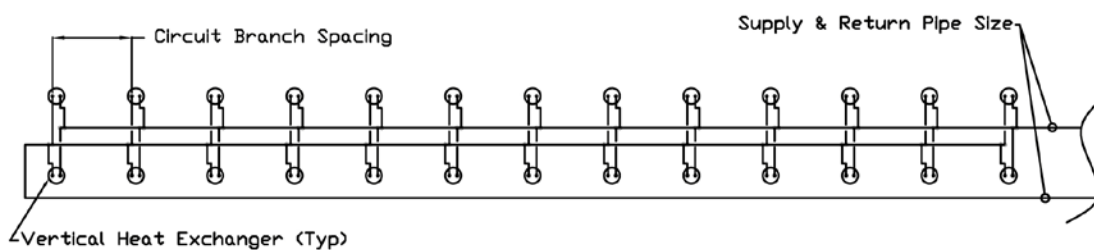
Horseshoe Circuit Header Design



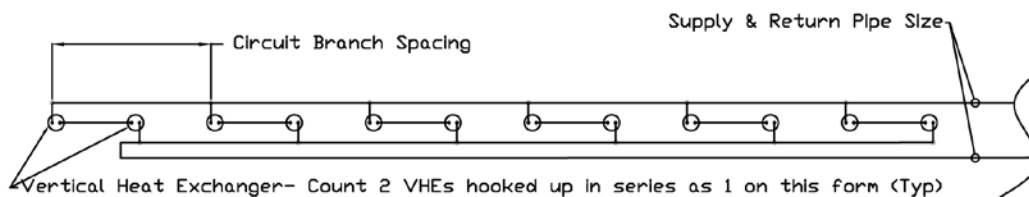
Staggered Circuit Header Design



Paired Circuit Header Design



VHE Series Circuit Header Design



Notice: Information contained in this document is subject to change without notice. This document reports accurate and reliable information to the best of our knowledge but our suggestions and recommendations cannot be guaranteed because the conditions of use are beyond our control. The user of such information assumes all risk connected with the use therefore. GHP Systems, Inc. assumes no responsibility for the use of information presented herein and hereby disclaims all liability in regard to such use. GHP Systems, Inc. reserves the right to upgrade the design/specifications of the GeoHeader® without notice.



Explanation of Tables and Detail Drawings

GHP Systems, Inc.
1000 32nd Ave
Brookings, SD 57006

(605) 697-7869 tel
(605) 697-9118 fax
888-447-7757 toll-free
www.ghpsystems.com

Select the correct circulating solution tables

Water (top table on page 1 & 3)

Use this table for straight water circulating solutions at all temperatures and for antifreeze/inhibitor circulating solutions where the temperatures remain above 60 °F.

25% Propylene Glycol (bottom table on page 1 & 3)

Use this table for antifreeze/inhibitor circulating solutions where the temperatures will be colder. This table's solutions where the temperatures remain above 60 °F.

VHE Circuit Sizing Tables (Explanation of Column Headings page 1 top & bottom tables)

Vertical Heat Exchanger (VHE): The u-bend or borehole pipe.

Pipe Size: The VHE pipe size is typically 3/4", 1" or 1 1/4" as shown in the table.

Flow Rate: The design GPM to flow through each VHE during operation.

Reynolds Number: This dimensionless number determines if the circulating fluid is in turbulent (>2300) or laminar flow through the selected pipe size at the design flow rate.

Head Loss (Hd Loss): The VHE head loss at the listed flow rate (GPM) in feet of head per 100' of pipe.

2" Circuit Pipe, 3" Circuit Pipe or 4" Circuit Pipe: Select the supply and return pipe size to be used.

Optimum number of VHEs (Optm # VHEs): The number of VHEs that can go on the selected circuit size with a head loss of approximately 3 feet of head per 100' of pipe at the given VHE flow rate.

Supply and Return Head Loss (S/R Hd Loss): The actual head loss of the selected circuit pipe size in feet of head per 100' of pipe at a given VHE flow rate. $\text{Circuit Flow Rate} = (\# \text{ VHEs}) \times (\text{VHE Flow rate})$

Flushing and Purging Flow Rate (Flush/Purge): The minimum required flow rate (GPM) required to achieve a velocity of 2 feet per second through all circuit sections and VHE pipe.

Circuit Header Design Detail Drawings (See corresponding Circuit Pipe Sizing Table for pipe section sizes on page 2.)

Standard: The most common circuit header design and is used for all supply & return circuit pipe sizes.

Horseshoe: This header design has a built-in reverse return design and is commonly used for 3" and larger supply/return circuit pipe sizes.

Staggered: This circuit header design alternates hookups between two rows of VHEs that are uniformly offset from each other.

Paired: This design has paired hookups between two rows of VHEs that are directly across from each other. Since pairs of VHEs are hooked-up next to each other the pipe sizing sections are increased two section sizes at a time when using the Circuit Pipe Sizing Tables.

VHE Series: Header design is typically only used for shorter VHE depths to increase flow rates by connecting two or more of them in series.

Circuit Pipe Section Sizing Tables (Explanation of Column Headings page 3 top & bottom tables)

(See corresponding Circuit Header Design Detail Drawings on page 2.)

Vertical Heat Exchanger (VHE): The u-bend or borehole pipe.

Pipe Size: The VHE pipe size is typically 3/4", 1" or 1 1/4" as shown in the table.

Flow Rate: This is the design GPM to flow through each VHE during operation.

Recommended Header Section Pipe Size: The recommended pipe size for each section of pipe between VHEs.

Section 1: The size of the header pipe between VHE 1 and VHE 2.

Section 2: The size of the header pipe between VHE 2 and VHE 3.

Section 3: The size of the header pipe between VHE 3 and VHE 4.

Section ##: Table goes up to 35 VHEs.

Note: The recommended pipe sizes optimize operating head loss versus flushing & purging flow rates. No pipe section will exceed 3.5 feet of head loss per 100' of pipe at the given VHE size and flow rate. The reduced header pipe sizing is designed to achieve a minimum velocity of 2 feet/second during the flushing/purging process.

Notice: Information contained in this document is subject to change without notice. This document reports accurate and reliable information to the best of our knowledge but our suggestions and recommendations cannot be guaranteed because the conditions of use are beyond our control. The user of such information assumes all risk connected with the use therefore. GHP Systems, Inc. assumes no responsibility for the use of information presented herein and hereby disclaims all liability in regard to such use. GHP Systems, Inc. reserves the right to upgrade the design/specifications of the GeoHeader® without notice.