Feet of Head Worksheet

FP = (Vh/2.33) + 4

FP = Operating Pressure Vh = Vertical Height

Vertical Height	Fill Pressure
12	
22	
35	



Calculating Feet of Head

$FH = (PL * 1.5) \times 0.04$ FH = Feet of Head PL = Total Pipe Loop Length Circ. Ft. Head $\frac{84}{170}$ 240

Hydronic Components Circulator Sizing

Zone 1

Total perimeter pipe length Vertical pipe length Total pipe length Total for fittings Total Feet/Head Flow GPM

Zone 2

Total perimeter pipe length Vertical pipe length Total pipe length Total for fittings Total Feet/Head Flow GPM



Heat Loss 62,410

Hydronic Components Circulators



Determine boiler manifold piping size

 $gpm = Btuh/(\Delta T x 500)$

 $GPM_{(flow)} = /(\varDelta T \times 500)$ Do the math in parenthesis first

Then loose the parenthesis

"



GPM(flow) =

Boiler Manifold Pipe Size

Insert info on to worksheet WS3-2

Boiler Ratings

	Serie	s MI85™/MIHI	I ^m /MI ^m	
Boiler Model Number	Input, MBH	Heating Capacity ³ , MBH	Net Ratings Water ^{1,2} , MBH	
MI85-03	60	51	44	
MI85-04	90	77	67	
MI85-05	120	102	89	
M185-06	150	128	111	
MIHII-03	65	55	48	
MIHII-04	97.5	82	71	
MIHII-05	130	110	96	
MIHII-06	162.5	137	119	
MI-03	70	58	50	
MI-04	105	86	75	
MI-05	140	115	100	
MI-06	175	143	124	
MI-07	195	160	139	
MI-08	227.5	186	162	
MI-09	260	211	183	

Pipe Size Chart

Pipe Size (inches)		+ Friction Head Feet per 100'		Velocity Flow of Water		
	MBH		GPM at 20° T.D.	Inches per Second	Feet per Min.	
1/2	17	4.2'	1.7	23	115	
3/4	39	4.2'	3.9	27	135	
1	71	4.2'	7.1	34	170	
1-1/4	160	4.2'	16.0	40	200	
1-1/2	240	4.2'	24.0	*45	225	
2	450	4.2'	45.0	*54	270	
2-1/2	750	4.2'	75.0	*62	310	
3	1400	4.2'	140.0	*72	360	
4	2900	4.2'	290.0	*80	400	

What does this look like

Transfer info from worksheet



Gathering IWH Info

	Alliance SL									
-				Performance	Specification	S		Phys	ical Specific	ations
		First (gal.	First Hour ¹ Bi (gal./hr.) Ou		ur ¹ Boiler Boiler Water r.) Output ² Continuous Flow Stand		Standby			
Model	Storage (gallons)	@115°F	@140°F	(6 GPM @ 200°F) BTU/hr.	Flow Rate (gal./min.)	Head Loss (ft./w.c.)	Heat Loss (°F/hr.)	Height (in.)	Diameter (in.)	Shipping Weight (lbs.)
AL27SL	27	295	225	150,000		7	0.78	39.25	20	172
AL35SL	35	300	230	150,000	6	7	0.72	39.25	22.75	185
AL50SL	50	320	250	150,000	U	7	0.56	40.75	26	238
AL70SL	70	340	270	150,000	6	7	0.45	45.75	28	290
AL70CSL*	70	475	385	235,000	14	14	0.45	45.75	28	290

US Boiler Alliance IWH

Pipe Sizing	AL35SL – Flow requirement			
Pipe Sizing	GPM through tank coil			
Pipe Size	copper piping			

Determine Pipe Sizes



Simplified drawing for clarity



Simplified drawing for simplicity





Simplified drawing for clarity

Determine Pipe Sizes

Both zones are ³/₄"

Added zone valves, now what happens?



Simplified drawing for clarity



Simplified drawing for clarity

Tube Size & Flow (GPM)					
Tube	Minimum	Maximum			
Size	Flow Rate*	Flow Rate**			
1/2" Copper	1.6	3.2			
3/4" Copper	3.2	6.5			
1" Copper	5.5	10.9			
1-1/4" Copper	8.2	16.3			
1-1/2" Copper	11.4	22.9			
2" Copper	19.8	39.6			
2-1/2" Copper	30.5	61.6			
3"	43.6	87.1			
3/8" Pex	0.6	1.3			
1/2" Pex	1.2	2.3			
5/8" Pex	1.7	3.3			
3/4" Pex	2.3	4.6			
1" Pex	3.8	7.5			
1-1/4" Pex	5.6	11.2			
1-1/2" Pex	7.8	15.6			
2" Pex	13.4	26.8			
3/8" Pex-AL-Pex	0.6	1.2			
1/2" Pex-AL-Pex	1.2	2.5			
5/8" Pex-Al-Pex	2.0	4.0			
3/4" Pex-Al-Pex	3.2	6.4			
1" Pex-AL-Pex	1" Pex-AL-Pex 5.2 10.4				
* Based on 2' per second					
** Based on 4' per second					

Pipe Size (inches)	MBH	1 1		Velocity Flow of Water	
		+ Friction Head Feet per 100'	GPM at 20° T.D.	Inches per Second	Feet per Min.
1/2	17	4.2'	1.7	23	115
3/4	39	4.2'	3.9	27	135
1	71	4.2'	7.1	34	170
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2-1/2	750	4.2'	75.0	*62	310
3	1400	4.2'	140.0	*72	360
4	2900	4.2'	290.0	*80	400





Multiple Boiler Common Pipe Sizes

WS4.1