Flow Calculations

5/28/2024

Assumptions:

1. Turbulent flow regime

2. Fluid properties

Fluid: diesel at 60 deg F specific gravity dyn viscosity ft^2/s 4.31E-05

21.5 total flow rate, gpm max duty cycle 50% total fuel per 12 hrs gal 7700 Number of hoses 3 hose flow rate, gpm 7.2 P max psi #REF!

https://energy-models.com/pipe-sizing-charts-tables https://ntrs.nasa.gov/api/citations/19660024205/downloads/19660024205.pdf

Schiller Darcy-Weisbach eqn 0.0054+0.396/R dP=f L rho/2 v^2 /D

	Part	ID , in.	Length (ft)	L/D	velocity, ft/s	Re (vD/nu)	f	dP (psi)	total P (psi)	Notes
B_1	filter	2.00			0.73	2.83E+03	0.042	6.72		dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	2.93	5.67E+03	0.035	0.13		
	elbow	0.50		45.00	11.71	1.13E+04	0.029	1.08		
	hose	0.75	200	3200.00	5.21	7.56E+03	0.033	16.73	24.65	
B_2	filter	2.00			0.73	2.83E+03	0.042	6.72		dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	2.93	5.67E+03	0.035	0.13		
	elbow	0.50		45.00	11.71	1.13E+04	0.029	1.08		
	hose	0.75	300	4800.00	5.21	7.56E+03	0.033	25.09	33.01	
	£11	0.00			0.70	0.005.00	0.040	0.70		10
B_3	filter	2.00			0.73	2.83E+03	0.042	6.72		dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	2.93	5.67E+03	0.035	0.13		
	elbow	0.50		45.00	11.71	1.13E+04	0.029	1.08		
	hose	0.75	450	7200.00	5.21	7.56E+03	0.033	37.63	45.56	
B_4	filter	2.00			0.73	2.83E+03	0.042	6.72		dP approximation per FAS
D_4			C 00	72.00		5.67E+03				ur approximation per ras
	manifold to hose	1.00	6.00	72.00	2.93		0.035	0.13		
	elbow	0.50		45.00	11.71	1.13E+04	0.029	1.08		
	hose	0.50	200	4800.00	11.71	1.13E+04	0.029	114.87	122.80	

0.88

Flow Calculations 5/28/2024

3/26/2024

Assumptions:

1. Turbulent flow regime

2. Fluid properties

Fluid: diesel at 60 deg F specific gravity 0.88 dyn viscosity ft^2/s 4.31E-05

 total flow rate, gpm
 21.5

 max duty cycle
 50%

 total fuel per 12 hrs
 gal
 7700

 Number of hoses
 5

 hose flow rate, gpm
 4.3

 P max
 psi
 #REF!

https://energy-models.com/pipe-sizing-charts-tables https://ntrs.nasa.gov/api/citations/19660024205/downloads/19660024205.pdf

Schiller Darcy-Weisbach eqn $0.0054+0.396/R dP=f L rho/2 v^2/D$

	Part	ID , in.	Length (ft)	L/D	velocity, ft/s	Re (vD/nu)	f	dP (psi)	total P (psi)	Notes
B_1	filter	2.00			0.44	1.70E+03	0.048	6.72		dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	1.76	3.40E+03	0.040	0.05		
	elbow	0.50		45.00	7.03	6.80E+03	0.033	0.44		
	hose	0.75	200	3200.00	3.12	4.53E+03	0.037	6.85	14.06	
B_2	filter	2.00			0.44	1.70E+03	0.048	6.72		dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	1.76	3.40E+03	0.040	0.05		
	elbow	0.50		45.00	7.03	6.80E+03	0.033	0.44		
	hose	0.75	300	4800.00	3.12	4.53E+03	0.037	10.28	17.49	
В 3	filter	2.00			0.44	1.70E+03	0.040	6.72		dD
B_3			0.00	70.00			0.048			dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	1.76	3.40E+03	0.040	0.05		
	elbow	0.50	150	45.00	7.03	6.80E+03	0.033	0.44	22.22	
	hose	0.75	450	7200.00	3.12	4.53E+03	0.037	1 5.42	22.63	
B_4	filter	2.00			0.44	1.70E+03	0.048	6.72		dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	1.76	3.40E+03	0.040	0.05		ar approximation por the
	elbow	0.50	0.00	45.00	7.03	6.80E+03	0.033	0.44		
	hose	0.50	200	4800.00	7.03	6.80E+03	0.033	46.95	54.16	
	nose	0.50	200	+300.00	7.03	0.00L 103	0.033	40.55	34.10	