

Vacuum pneumatic conveying calculation input screen

Client: RJB324 File path: c:\varjb.txt Product: PVCPowder

Gas medium

Air
 Nitrogen

Gas pump

Screwcompressor with pre-inlet
 Screwcompressor without pre-inlet
 Predefined screwcompr. with preinlet
 Predef. screwcompr. without pre-inlet
 Blower data with pre-inlet
 Blower data without pre-inlet
 Predefined blower with pre-inlet
 Predefined blower without pre-inlet
 Constant mass vacuum pump (Turbo)

Vac. pump displ: 1,557 m3/sec
Maximum vacuum: 0,75 bar

Rotary lock

Install(ed)

Set Capacity: tons/hr
Capacity: tons/hr
Lock volume: m3
RPM: /min
Leakage: m3/sec

Ambient

Ambient temperature: 25 degr C
Ambient/starting pressure: 1000 mbar

Temperatures

Product temperature: 40 degr C
 Screwcompressor air cooling: degr C
Heat transmission fact. pipewall: 0,18 kcal/degC/m

GroupBox7

PVCPowder

Product density: 1682 kg/m3
Bulk density: 640 kg/m3
Particle size: 400 micron
Suspension velocity: 3,72 m/sec
Product loss constant: 0
Product loss factor: 3,2318E-11
Wall friction factor: 0,5
Intake pressure drop suction: 100 mmWC
v-wall / v-susp: 1,5
Filter resistance factor: 500000
Specific heat content: 0,2
product loss factor constant y/n: n

Filter

Filter area: 90 m2

Convey pipeline

Convey length horizontal: 82,6 m
Convey length vertical: 21,2 m
Total length: 107,4 m
Number of Bends: 15

Intake nozzle with cone: 1 * D
Pipe diameter begin: 260 mm
Pipe diameter end: 260 mm

Calculation settings

Vacuum system

Set capacity: 35 tons/hr
Set vacuum: 4000 mmWC

Calculation selection

Vacuum fixed -> capacity calculated
 Capacity fixed -> vacuum calculated
 Vacuum and capacity fixed -> intake pressure drop calculated
 Vacuum and capacity fixed -> constant cwp calculated
 Vacuum and capacity fixed -> cwp-factor calculated
 product loss factor (cwp) kept constant

Calculation Table Vacuum Conveying



Client: RJB324
 Filepath: c:\varjb.txt
 product: PVC Powder 5 of 5

Convey Length horizontal: 82.6 m
 Convey Length vertical: 21.2 m
 Total Length: 107.4 m
 Number of Bends: 15
 Pump displ. at 0.65 bar(u): 1.557 m3/sec
 Rotarylock leakage: 0 m3/sec
 Gas displacement at end: 1.5787 m3/sec

Capacity: 35 tons/hr
 Vacuum: 4000 mmWC
 Rotarylock capacity: 0 tons/hr
 Pressure drop: 4000 mmWc
 Loading ratio: 8.7

Pipeline energy consumption: 2.35 kWh/ton
 Vacuum pump power: 82 kW
 Conveying energy: 49.5 kW
 Pneumatic conveying efficiency: 60.1 %
 Bend losses: 10.8 kW
 Material intake loss: 1 kW

Re-number * 10⁻⁵: 4.824
 Empty pipeline pressure drop: 982 mmWc
 Empty pipeline filter press. drop: 147 mmWc
 Material loss factor: 3.2318E-11
 Constant loss factor
 Material intake pressure drop: 100 mmWc

Progress
 Filter: 
 Iteration: 

Part	Part description	Length(ł)	v-gas	v-product	Pressure drop	v-wall/v-susp	residence time	mass kg	kW	kW%	kW	Bend loss % kW	Sediment
1	Intake	1,2	19,64	12,35	201	2,16	0,134	0	2	4,1			
2	Bend		19,47	7,66	201		0,1778	0	0		0,4	0,9	
3	Pipe	1,8	19,56	14,14	262	2,25	0,3298	1	0,6	1,2			
4	Bend		19,39	8,34	262		0,3687	0	0		0,6	1,2	
5	Pipe	2,31	19,62	13,9	367	2,25	0,5597	1	1	2,1			
6	Bend		19,45	7,88	367		0,6001	0	0		0,6	1,2	
7	Pipe	2,5	19,84	13,23	530	2,27	0,8151	1	1,6	3,3			
8	Bend		19,67	7,83	530		0,8569	0	0		0,5	1,1	
9	Pipe	11	20,07	15,71	836	2,28	1,6199	7	3,1	6,4			
10	Bend		19,89	8,99	836		1,6555	0	0		0,8	1,6	
11	Pipe	4,8	20,63	14,07	1103	5,6	2,0285	3	2,8				
12	Bend		20,45	8,32	1103		2,0679	0	0		0,6	1,2	
13	Pipe	1	20,8	12,79	1164	2,33	2,1589	0	0,6	1,3			
14	Bend		20,62	9,82	1164		2,1777	0	0		0,3	0,6	
15	Pipe	20,01	21,78	16,61	1664	2,38	3,4547	12	5,5	11,1			
16	Bend		21,59	9,82	1664		3,4879	0	0		0,8	1,7	
17	Pipe	12,01	22,69	16,94	2011	2,42	4,2569	7	4	8			
18	Bend		22,49	10	2011		4,2895	0	0		0,9	1,8	
19	Pipe	4,51	23,2	16,34	2182	2,45	4,5995	2	2	4,1			
20	Bend		23	9,65	2182		4,6333	0	0		0,8	1,7	
21	Pipe	7,4	23,95	17,16	2435	2,49	5,1134	4	3,1	6,2			
22	Bend		23,74	10,13	2435		5,1456	0	0		0,9	1,8	
23	Pipe	20,7	26	18,32	3036	2,59	6,3536	11	7,7	15,6			
24	Bend		25,77	10,54	3036		6,3842	0	0		1	2,2	
25	Pipe	15,2	29,07	18,07	3760	2,74	7,2912	8	10,3	20,8			
26	Bend		28,82	10,68	3760		7,3218	0	0		1	2	
27	Pipe	0,5	29,38	13,75	3794	2,76	7,3628	0	0,5	1			
28	Bend		29,12	7,77	3794		7,4038	0	0		0,6	1,2	
29	Pipe	0,5	29,67	12,33	3840	2,78	7,4528	0	0,7	1,4			
30	Bend		29,41	7,29	3840		7,4978	0	0		0,4	0,9	
32	Outlet		30,03	16,99	3925		7,6468		0,5122				
33	Filter	90 m2	1	m/min	4000		7,6468		1,1688		6	74	mmWC

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