

Pressure pneumatic conveying calculation Input screen

Client:  File path: Quick modeling Product: Alumina

**Gas medium**  
 Air  
 Nitrogen

**Gas pump**  
 Screwcompressor  
 Predefined screwcompressor  
 Blower data  
 Predefined blower

Gas Volume: 0,4 m3/sec  
 Maximum pressure: 3,5 bar

**Booster**  
 Installed  
 Screwcompressor  
 Predefined screwcompressor  
 Blower data  
 Predefined blower  
 Gas Volume: m3/sec  
 Injection point:

**Rotary lock**  
 Install  
 Capacity: tons/hr  
 Lock volume: m3  
 RPM: /min  
 Leakage: m3/sec

**Ambient**  
 Ambient temperature: 25 degr C  
 Ambient pressure: 1000 mbar

**Temperatures**  
 Alumina temperature: 40 degr C  
 Screwcompressor air cooling: degr C  
 Booster air cooling: degr C  
 Heat transmission factor pipewall: 0,18 kCal/degC/m

**Convey pipeline**  
 Convey length horizontal: 80 m  
 Convey length vertical: 19 m  
 Total length: 99 m  
 Number of Bends: 6  
 Pipe diameter begin: 180 mm  
 Pipe diameter end: 180 mm

**Product parameters**  
**Alumina**  
 Product density: 3400 kg/m3  
 Bulk density: 1220 kg/m3  
 Particle size: 1b micron  
 Suspension velocity: 1 m/sec  
 Product loss constant: 0,095  
 Product loss factor: 1,18E-08  
 Wall friction factor: 0,5  
 Intake pressure drop pressure discharge: 100 mmWC  
 v-waal / v-susp: 1,5  
 Filter resistance factor: 1500000  
 Specific heat content: 0,2 kCal/kg/C  
 product loss factor constant y/n: n

**Calculation settings**  
 Set capacity: 12 tons/hr  
 Pressure: 3125 mmWC  
 Back pressure: 0 mmWC  
 Set pressure drop: 3125 mmWC

**Calculation selection**  
 Pressure fixed -> capacity calculated  
 Capacity fixed -> pressure calculated  
 Pressure and capacity fixed -> intake pressure drop calculated  
 Pressure and capacity fixed -> constant loss factor calculated  
 Pressure and capacity fixed -> material loss factor calculated  
 product loss factor (cwp) kept constant

**Filter**  
 Filter area: 48 m2



Calculation Table Pressure Conveying

Client:  Filepath: Quick modeling 5 of 5 Product: Alumina

Convey Length horizontal: 80 m  
 Convey Length vertical: 19 m  
 Total Length: 99 m  
 Number of Bends: 6  
 Pump displacement at 2.5 bar(s): 0,4 m3/sec  
 Volumetric efficiency: 0,92 %  
 Booster displacement: 0 m3/sec  
 Rotarylock leakage: 0,014 m3/sec  
 Gas displacement at end: 0,4214 m3/sec  
 Capacity: 12,3 tons/hr  
 Pressure: 3125 mmWC  
 Back pressure: 0 mmWC  
 Pressure drop: 3125 mmWC  
 Loading ratio: 6,8  
 Pipeline energy consumption: 2,79 kWh/ton  
 Compressor power: 34 kW  
 Conveying energy: 11,6 kW  
 Pneumatic conveying efficiency: 33,6 %  
 Bend losses: 1,8 kW  
 Material intake loss: 0,39 kW  
 Re-number \* 10<sup>-5</sup>: 1,839  
 Empty pipeline pressure drop: 610 mmWc  
 Empty pipeline filter press. drop: 108 mmWc  
 Material loss factor: 1,18E-08  
 Lossfactor at end: 0,0394  
 Intake pressure drop: 100 mmWc

**Table calculation**

Part	Part description	Length(l)	v-gas	v-product	Pressure drop	y-wall/ y-susp	residence time	mass kg	kW	% kW	Bend loss kW	% kW	Sediment
1	Intake	1	12,95	12,26	210	6,04	0,0903	0	0,7	6,6			
2	Pipe	17,25	13,29	12,29	560	6,12	1,4893	4	1,1	10,1			
3	Bend		13,29	1,99	560		1,7908	1	0		0,2	2,1	
4	Pipe	17,25	13,7	12,64	990	6,21	3,1805	4	1,4	12,6			
5	Bend		13,7	1,99	990		3,4835	1	0		0,2	2,2	
6	Pipe	17,25	14,21	13,07	1433	6,33	4,8303	4	1,5	13,4			
7	Bend		14,21	1,99	1433		5,1352	1	0		0,2	2,4	
8	Pipe	13,25	14,67	13,46	1801	6,43	6,1398	3	1,3	11,5			
9	Diameter Transfer			13,46	1801		6,1398		0	0			
10	Pipe	4	14,78	13,56	1889	6,45	6,4359	1	0,3	2,8			14,67
11	Bend		14,78	1,99	1889		6,6364	0	0		0,3	2,6	
12	Pipe	0	15,09	2,22	1889	6,59	6,6365	0	0	0			
13	Diameter Transfer		15,09	2,22	1889		6,6365		0	0			
14	Pipe	19	15,96	14,3	2711	6,71	8,0169	4	3,2	27,5			
15	Bend		15,96	1,99	2711		8,5959	2	0		0,3	2,9	
16	Pipe	10	16,47	14,96	3038	6,81	9,2811	2	1,3	11,5			
17	Bend		16,47	1,99	3038		9,6277	1	0		0,3	3,2	
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													
18	Outlet		16,47	1,99	3038		9,6277		0,0687				
19	Filter 48 m2		0,5	m/min	3125		9,6277		0,3634	86	mmWC		

Progress  
 Filter:   
 Iteration: 

Calculation results pressure conveying

Client:

Filepath:

Product:

**Installation**

Convey distance horizontal:  m

Convey distance vertical:  m

Total conveying length:  m

Number of Bends:

Pipe diameter(s):   mm

Compressor displacement:  m<sup>3</sup>/sec

Booster displacement:  m<sup>3</sup>/sec

**Calculation results**

Capacity:  tons/hr

Pressure:  mmWC

Booster pressure:  mmWC

Back pressure:  mmWC

Pressure drop:  mmWc

Loading ratio:

Empty pipeline pressure:  mmWc

Residence time:  seconds

Re-number \* 10<sup>-5</sup>:

Mixture density:  kg/m<sup>3</sup>

Mass of material in pipeline:  kg

**Pressure drops**

Product intake:  mmWC

Nozzle:  mmWC

Acceleration excl product resistance:  mmWC

Product resistance:  mmWC

Elevation:  mmWC

Suspension:  mmWC

Gas:  mmWC

Filter:  mmWC

**Feeder system**

Installation system:

2-vessel system    Rotary lock feeder    silo unloading airtlides

3-vessel system    screw feeder

Vessel factor:  tons/hr/bar(a)

Nominal capacity:  tons/hr

vessel volume:  m<sup>3</sup>

Vessel product volume:  m<sup>3</sup>

pipevolume:  m<sup>3</sup>

pressure begin pressurizing:  bar

pressure valve open:  bar

temperature begin pressurizing:  C

temperature after pressurizing:  C

pressurizing time:  seconds

Discharging time:  seconds

purging time:  seconds

valve time:  seconds

overlap time:  seconds

cycle time:  seconds

Number of kettles/hr:  -

vessel capacity:  tons/hr

Vessel content:  tons

pipe content:  kgs

Pipeline capacity:  tons/hr

System capacity:  tons/hr

at pressure:  bar

Energy consumption/ton:  kW/ton

**Energy**

(Screw)compressor

Compressor power:  kW

Booster power:  kW

Pipeline energy consumption/ton:  kW/ton

**Temperatures**

Ambient temperature:  degr C

Outlet temperature compressor:  degr C

Outlet temperature booster:  degr C

Mixture temperature begin:  degr C

Mixture temperature end:  degr C

**Table calculation**

Begin capacity:  tons/hr

Begin pressure:  mmWc

pressure decrement:  mmWc

lowest pressure:  mmWc

**Kettle capacity > capacity**

Calculate system capacity

Calculate table

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