

Blower data

Data

Air

q0 per revolution 0,5 dm3/rev

qv 100 0,2 m3/min/100 mbar

No load power at nominal rpm 0,2 kW

RPM nominal 4800 /min

RPM actual 4500 /min

Number of pumps 1 -

Ambient temperature 25 degrC

Ambient pressure 1000 mbar

Blower intake temperature 25 degrC

Vacuum 6500 mmWC

No pre-inlet Pre-inlet

Pump displacement (Q0) 0,037 m3/sec

Air displacement (Q1) 0,022 m3/sec

1,34 m3/min

Volumetric efficiency 59,9 %

Power 2,6 kW

Calculate airflow/power Table calculation

Show blower data

Blower type

Fictive

Table calculation

Vacuum	Q1 m3/sec	Q1 m3/min	Vol.Eff %	d(temp) degr.C	Outlet temp degr.C	Power kW
0	0,037	2,2	100	0	25	0,1
1000	0,033	2	90,2	10	35	0,5
2000	0,031	1,9	85,3	24	49	0,9
3000	0,03	1,8	80,7	44	69	1,3
4000	0,028	1,7	76	73	98	1,6
5000	0,026	1,5	70,6	118	143	2

Back to Menu Predefined blowers Back to Importing Installation description Accept/back to input screen

Vacuum pneumatic conveying calculation input screen

Client Visanu File path c:\N\visib.txt Product CaCO3 Calcium Carbonate

Gas medium Air Nitrogen

Gas pump

Screwcompressor with pre-inlet

Screwcompressor without pre-inlet

Predefined screwcompr. with preinlet

Prefef. 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 0,028 m3/sec

Maximum vacuum 0,65 bar

Feeder/Discharger

Bottom/mixing feeder Screw discharge

Rotary lock

Set Capacity tons/hr

Capacity tons/hr

Lock volume m3

RPM /min

Leakage m3/sec

Ambient (Vacuumpump outlet)

Ambient/intake temperature 25 degrC Altitude 0 m

Ambient/starting pressure 1000 mbar Altitude pressure 1013 mbar

Temperatures

CaCO3 Calcium Carbonate temperature 40 degr C

Heat transmission fact. pipewall 0,18 kcal/degC/m

Material properties

CaCO3 Calcium Carbonate

Product density 2670 kg/m3

Bulk density 1000 kg/m3

Particle size 15 micron

Suspension velocity 1,2 m/sec

Product loss constant

Product loss factor 1,462614E-11

Wall friction factor 0,5

Intake pressure drop suction v-wall / v-susp 100 mmWC

1,5

Filter resistance factor 1500000

Specific heat content 0,18 kCal/kg/C

product loss factor constant γ/n n

Change product

Filter

Filter area 10 m2

Convey pipeline

Convey distance horizontal 4 m

Convey distance vertical 6 m-up 0 m-down

Convey distance slope 0 m-up 0 m-down

Total conveying length 10 m

Number of Bends 2

Intake nozzle with cone 1 * D

Pipe diameter begin 54 mm

Pipe diameter end 54 mm

Calculation settings

Vacuum system

Set capacity 5,1 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

Calculate

Back to start menu

Vacuum pneumatic conveying calculation input screen

Client: Visanu | File path: c:\V\avis.txt | Product: CaCO3 Calcium Carbonate

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: 0,028 m3/sec
 Maximum vacuum: 0,65 bar

Feeder/Discharger
 Bottom/mixing feeder Screw discharge
 Rotary lock
 Set Capacity: _____ tons/hr
 Capacity: _____ tons/hr
 Lock volume: _____ m3
 RPM: _____ /min
 Leakage: _____ m3/sec

Ambient (Vacuumpump outlet)
 Ambient/Intake temperature: 25 degrC | Altitude: 0 m
 Ambient/starting pressure: 1000 mbar | Altitude pressure: 1013 mbar

Temperatures
 CaCO3 Calcium Carbonate temperature: 40 degr C
 Heat transmission fact. pipewall: 0,18 kcal/degC/m

Material properties
CaCO3 Calcium Carbonate
 Product density: 2670 kg/m3
 Bulk density: 1000 kg/m3
 Particle size: 15 micron
 Suspension velocity: 1,2 m/sec
 Product loss constant: _____
 Product loss factor: 1,462614E-11
 Wall friction factor: 0,5
 Intake pressure drop suction: 100 mmWC
 v-wall / v-susp: 1,5
 Filter resistance factor: 1500000
 Specific heat content: 0,18 kcal/kg/C
 product loss factor constant y/n

Filter
 Filter area: 10 m2

Convey pipeline
 Convey distance horizontal: 4 m
 Convey distance vertical: 6 m-up 0 m-down
 Convey distance slope: 0 m-up 0 m-down
 Total conveying length: 10 m
 Number of Bends: 2
 Intake nozzle with cone 1 * D
 Pipe diameter begin: 54 mm
 Pipe diameter end: 54 mm

Calculation settings
Vacuum system
 Set capacity: 5,1 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

Buttons: Back to start menu, Calculate

Calculation results vacuum discharge

Client: Visanu | Filepath: c:\V\avis.txt | Product: CaCO3 Calcium Carbonate

Convey pipeline
 Convey distance horizontal: 4 m
 Convey distance vertical: 6 m
 Total Length: 10 m
 Number of Bends: 2
 Begin diameter: 54 mm
 End diameter: 54 mm

Vessel system
 2-vessel system 3-vessel system Bottom mixing feeder

Calculation results
 Capacity: 5,1 tons/hr
 Vacuum: 4000 mmWC
 Pressure drop: 4000 mmWC
 Loading ratio: 63,5
 Empty pipeline vacuum: 200 mmWC
 Residence time: 1,28 seconds
 Re-number * 10⁵: 0,415
 Mixture density: 75,2 kg/m³
 Mass of material in pipeline: 1 kg

Pressure drops
 Product intake: 100 mmWC
 Nozzle: 536 mmWC
 Acceleration excl product resistance: 420 mmWC
 Product resistance: 2478 mmWC
 Elevation: 321 mmWC
 Suspension: 563 mmWC
 Gas: 123 mmWC
 Filter: 6 mmWC

Vacuum pump
 Blower without pre-inlet
 Vacuum pump displacement: 0,028 m3/sec

Energy
 Vacuum pump power: 1,68 kW
 Pipeline energy consumption/ton: 0,32 kWh/ton
 Product loss energy -> heat: 0,121 kWh/ton

Temperatures
 Ambient temperature: 25 degr C
 Outlet temperature vacuum pump: 98 degr C
 Mixture temperature begin: 41 degr C
 Mixture temperature end: 31 degr C

Table calculation
 Begin capacity: 5,1 tons/hr
 Begin vacuum: 4000 mmWC
 lowest vacuum: 500 mmWC
 vacuum decrement: 175 mmWC

Vessel system details
 Filter vessel volume: _____ m³
 Discharge vessel volume: 10 m³
 Total vessel volume: _____ m³
 Material volume: 7 m³
 vacuum pipe volume: 0,02 m³
 pressure begin vacuuming: -0,05 bar
 vacuum: 4000 bar
 temperature begin vacuuming: 30 C
 temperature after vacuuming: 30 C
 begin mass kettle: 11,5 kg gas
 tank pressure after vacuuming: 0,599 bar(abs)
 end mass kettle: 6,7 kg gas
 evacuated mass: 4,8 kg gas
 gas density: 0,69 kg/m3
 vacuumizing time: 182 seconds
 Number of kettles/hr: 0,7

Additional results
 vessel content: 7 tons
 Silo/cargo unloading efficiency: 100 %
 Uninterrupted capacity: 5,12 tons/hr
 Interrupted capacity: 4,94 tons/hr
 vacuum: 0,4 bar
 Energy consumption: 0,32 kWh/ton
 Total energy consumption/ton: 0,34 kWh/ton

Buttons: Back to start menu, Print calculation result, Calculate interrupted capacity, New Calculation, Calculate table

Table calculation

Vacuum conveying

Client: Visanu
 Filepath: c:\V\visis.txt
 Product: CaCO3 Calcium Carbonat
 Altitude: 0 m

Convey distance horizontal: 4 m
 Convey distance vertical: 6 m-up 0 m-down
 Total conveying length: 10 m
 Number of Bends: 2
 Pipe diameter begin: 54 mm
 Pipe diameter end: 54 mm

Pump displacement: 0,028 m3/sec (Blower)
 Gas volume end: 0,0383 m3/sec

Two vessel + bottom mixing feeder installation

MM-DD-YY
 10-01-2009

Table

Vacuum bar	Suction capacity tons/hr	Interrupted capacity tons/hr	Solid Loading Ratio SLR	gas velocity begin m/sec	gas velocity end m/sec	System energy consumption kWh/Ton	residence time seconds	Sediment
0,4	5,1	4,9	63,5	9,9	16,7	0,34	1,28	No sedimentation
0,3825	5	4,8	60,2	10,2	16,6	0,33	1,23	No sedimentation
0,365	4,9	4,8	57,2	10,6	16,5	0,32	1,18	No sedimentation
0,3475	4,9	4,8	54,6	10,9	16,4	0,31	1,13	No sedimentation
0,33	4,8	4,7	52	11,3	16,3	0,3	1,08	No sedimentation
0,3125	4,8	4,7	49,6	11,7	16,2	0,28	1,04	No sedimentation
0,295	4,7	4,6	47,1	12	16,2	0,28	1	No sedimentation
0,2775	4,6	4,5	44,8	12,4	16,1	0,27	0,97	No sedimentation
0,26	4,5	4,4	42,5	12,8	16,1	0,26	0,93	No sedimentation
0,2425	4,4	4,3	40,1	13,1	16	0,25	0,9	No sedimentation
0,225	4,3	4,2	37,8	13,5	16	0,24	0,87	No sedimentation
0,2075	4,2	4,1	35,5	13,9	16	0,23	0,84	No sedimentation
0,19	4	3,9	33,1	14,3	16	0,23	0,82	No sedimentation
0,1725	3,8	3,8	30,6	14,6	15,9	0,21	0,79	No sedimentation
0,155	3,6	3,6	28	15	15,9	0,21	0,77	No sedimentation
0,1375	3,3	3,3	25,2	15,4	15,9	0,21	0,75	No sedimentation
0,12	3	3	22,2	15,7	15,8	0,21	0,74	No sedimentation
0,1025	2,6	2,6	18,8	16,1	15,8	0,21	0,72	No sedimentation
0,085	2,2	2,2	15,1	16,4	15,7	0,23	0,7	No sedimentation
0,0675	1,6	1,6	10,9	16,7	15,6	0,27	0,69	No sedimentation
0,05	0,9	0,9	6,4	17	15,6	0,41	0,68	No sedimentation

Empty pipeline system pressure drop: 200 mmWC

Buttons: Back to start menu, Print table, New Calculation