

Modelling pipeline geometry

Installation description
 Client *
 Drive *
 Directory *
 Installation name * s = Suction or vacuum system
 Version s/d * d = Discharge or pressure system
 Full Path

Bend orientation
 (1) Vertical ascending to horizontal
 (2) Horizontal to vertical descending
 (3) Vertical descending to horizontal
 (4) Horizontal to vertical ascending
 (5) Horizontal to horizontal

Pipe Standard	ID	Standard	ID	Standard	ID
2"	54 mm	10"	254 mm	24"	590 mm
3"	78 mm	12"	304 mm	26"	643 mm
4"	102 mm	14"	336 mm	28"	693 mm
5"	128 mm	16"	387 mm	30"	743 mm
6"	154 mm	18"	438 mm	32"	793 mm
8"	203 mm	20"	489 mm	34"	843 mm

Part	Description	Diameter mm	Length m	Angle degrees	Radius mm	Bend angle degrees	Start angle degrees	Orientation
1	Intake	78	1	0				
2	Pipe	78	2.37	0				
3	Bend	78			200	90	33	4
4	Pipe	78	2.205	90				
5	Bend	78			200	90	33	1
6	Pipe	78	11.333	0				
7	Bend	78			200	90	33	5
8	Pipe	78	3.1	0				
9	Bend	78			200	90	33	4
10	Pipe	78	17.506	90				
11	Bend	78			200	90	33	1
12	Pipe	78	57.5	0				
13	Bend	78			200	90	33	2
14	Pipe	78	17.491	-90				
15	Bend	78			200	90	33	3
16	Pipe	78	9.078	0				
17	Outlet	78						

Part	Description	Diameter mm	Length m	Angle degrees	Radius mm	Bend angle degrees	Start angle degrees	Orientation
18	Filter	12	m2					
19	Pump	0.0717	m3/sec					

Total length 121.583 m
 Number of bends 7

Buttons: Back to menu, Back to Viewing/modifying installation, Save

Pressure pneumatic conveying calculation Input screen

Client File path Product

Gas medium
 Air Nitrogen

Gas pump
 Screwcompressor 2-stage
 Blower
 Compressor data
 Predefined screwcompressor
 Blower data
 Predefined blower
 Constant mas pump (sonic choke/Turbo)
 Centrifugal fan
 Gas volume m3/sec
 Maximum pressure bar

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

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

Ambient (Compressor intake)
 Ambient temperature degr C Altitude m
 Intake temperature degr C Altitude pressure mbar
 Ambient pressure mbar

Temperatures
 Carbon temperature degr C
 Compressor gas cooling degr C
 Booster gas cooling degr C
 Heat transmission factor pipewall kCal/sec/degC/m2

Material properties
Carbon
 Product density kg/m3
 Bulk density kg/m3
 Particle size micron
 Suspension velocity m/sec
 Product loss constant
 Product loss factor
 Wall friction factor
 Intake pressure drop pressure discharge mmWC
 v-wall / v-susp
 Filter resistance factor
 Specific heat content kCal/kg/C
 product loss factor constant y/n

Filter
 Filter area m2 Filter exhaust fan

Convey pipeline
 Convey distance horizontal m
 Convey distance vertical m-up m-down
 Convey distance slope m-up m-down
 Total conveying length m
 Number of Bends -
 Pipe diameter begin mm
 Pipe diameter end mm

Calculation settings
 Set capacity tons/hr
 Pressure mmWC bar
 Back pressure mmWC bar
 Set pressure drop mmWC bar
 Time domain dt seconds Default

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
 product loss factor (cwp) kept constant

Buttons: Back to start menu, Calculate

Calculation Table Pressure Conveying

Client Forum
 Filepath c:\V\dhora.txt
 Product Carbon

Convey distance horizontal 84 m
 Convey distance vertical 37 m
 Total conveying length 121 m
 Number of Bends 7
 Pump displacement at 2.5 bar 0.0709 m³/sec
 Volumetric efficiency 91.92 %
 Booster displacement 0.18 m³/sec
 Rotarylock leakage 0 m³/sec
 Gas displacement at end 0.2524 m³/sec
 Capacity 7.2 tons/hr
 Pressure 21131 mmWC 2.11 bar
 Back pressure 0 mmWC 0 bar
 Pressure drop 21131 mmWC 2.11 bar
 Loading ratio 6.71
 Pipeline energy consumption 7.66 kWh/ton
 Compressor + booster power 55 kW
 Conveying energy 28.9 kW
 Pneumatic conveying efficiency 52.4 %
 Bend losses 1 kW
 Material intake loss 0.02 kW
 Re-number 2.536 * 10⁻⁵
 Empty pipeline pressure drop 8822 mmWC
 Empty pipeline filter press. drop 580 mmWC
 Material loss factor constant 0.04465
 Material loss factor
 Intake pressure drop 100 mmWC

Progress
 Filter
 Iteration

Part	Part description	Length(m)	v-gas m/sec	v-product m/sec	Pressure drop mmWC	Pressure bar	v-wall/v-susp	residence time	mass kg	temperature degrC	kW	% kW	Bend loss kW	Sediment % kW
1	Intake 78 hor	1	5.04	3.14	381	2.07	0.34	0.435	0	32	0	0.3		
2	Pipe 78 hor + booster	2.38	18.86	12.04	830	2.03	1.38	0.662	0	43	0.3	1.3		
3	Bend		19.78	5.9	831	2.02		0.6879	0	43	0		0.1	0.3
4	Pipe 78 up	2.2	19.06	11.62	1395	1.97	1.39	0.8979	0	40	0.4	1.7		
5	Bend		19.99	5.92	1396	1.97		0.9245	0	40	0		0.1	0.3
6	Pipe 78 hor	11.33	19.63	12.4	3076	1.8	1.41	1.8685	1	32	1.5	5.2		
7	Bend		20.53	6.3	3077	1.8		1.8934	0	32	0		0.1	0.3
8	Pipe 78 hor	3.11	19.91	12.49	3608	1.75	1.43	2.1644	0	30	0.4	1.6		
9	Bend		20.85	6.13	3609	1.75		2.1895	0	30	0		0.1	0.4
10	Pipe 78 up	17.5	22.73	13.04	7365	1.37	1.52	3.6075	2	26	3.7	12.9		
11	Bend		23.71	6.64	7367	1.37		3.6312	0	26	0		0.1	0.4
12	Pipe 78 hor	57.5	36.55	17.42	16479	0.46	1.93	7.4293	6	25	12.1	42.1		
13	Bend		37.7	8.99	16482	0.46		7.4469	0	25	0		0.2	0.7
14	Pipe 78 down	17.49	43.69	19.39	18885	0.22	2.11	8.4079	1	25	4.5	15.6		
15	Bend		44.95	9.84	18887	0.22		8.4238	0	25	0		0.2	0.9
16	Pipe 78 hor	9.08	50.85	20.06	20602	0.05	2.27	8.9138	0	26	3.8	13.1		
17	Outlet		50.85	20.06	20602	0.05		8.9138		26	0.3920	1.3		
18	After Filter	12	m2	1.2	m/min	21131	-0.01	8.9138			1.2665	4.3	dp = 528	mmWC

Buttons: Back to start menu, Print calculation, Change product, New Calculation, Calculation results

Calculation results pressure conveying

Client Forum
 Filepath c:\V\dhora.txt
 Product Carbon

Installation
 Convey distance horizontal 84.3 m
 Convey distance vertical 37.2 m
 Total conveying length 121.5 m
 Number of Bends 7
 Pipe diameter(s) 78 mm 78 mm
 Compressor displacement 0.071 m³/sec 0.084 kg/sec
 Booster displacement 0.18 m³/sec 0.213 kg/sec
 Total gas displacement 0.251 m³/sec 0.297 kg/sec

Feeder system
 Installation system
 1-vessel system 3-vessel system screw feeder
 2-vessel system Bulk trailer unloading

Vessel factor 1000 tons/hr/m³/bar(a) vessel capacity 22.8 tons/hr
 Nominal capacity 0 tons/hr Vessel content 2.21 tons
 Vessel volume 2 m³ pipe content 14.7 kgs
 Vessel product volume 1.43 m³
 pipevolume 0.58 m³
 pressure begin pressurizing -0.05 bar Pipeline capacity 7.2 tons/hr
 pressure valve open 2.5 bar System capacity 6.9 tons/hr
 temperature begin pressurizing 35 C at pressure 2.11 bar
 temperature after pressurizing 60 C
 pressurizing time 30.9 seconds Pipeline energy consumption 7.66 kWh/ton
 Discharging time 1108.2 seconds System energy consumption 7.9 kWh/ton
 purging time 6.6 seconds
 valve time 2 seconds
 filling time seconds
 cyclotime 1147.8 seconds Total energy consumption 7.9 kWh/ton
 Number of kettles/hr 3.1

Kettle capacity > capacity --> extra air valve active
 Calculate system capacity

Pressure drops
 Product intake 100 mmWC 0.4 %
 Nozzle (total dp) 381 mmWC 1.8 %
 Acceleration excl product dp 1261 mmWC 5.9 %
 Product resistance 11846 mmWC 56 %
 Elevation 215 mmWC 1 %
 Suspension 1607 mmWC 7.6 %
 Gas 5734 mmWC 27.1 %
 Filter 528 mmWC 2.4 %

Energy
 (Screwcompressor)
 Compressor power 17 kW
 (Screwcompressor)
 Booster power 37 kW
 Product loss energy pipes -> heat 2.251 kW/ton
 Product loss energy bends -> heat 0.148 kW/ton
 Pipeline energy consumption/ton 7.662 kW/ton

Temperatures
 Ambient temperature 25 degr C
 Outlet temperature compressor 160 degr C
 Outlet temperature booster 155 degr C
 Material temperature 25 degr C
 Mixture temperature begin 32 degr C
 Mixture temperature end 26 degr C

Table calculation
 Begin capacity 7.2 tons/hr
 Begin pressure 21131 mmWc
 lowest pressure 2500 mmWc
 pressure decrement 931 mmWc
 Calculate table

Buttons: Back to start menu, Print calculation result, New Calculation