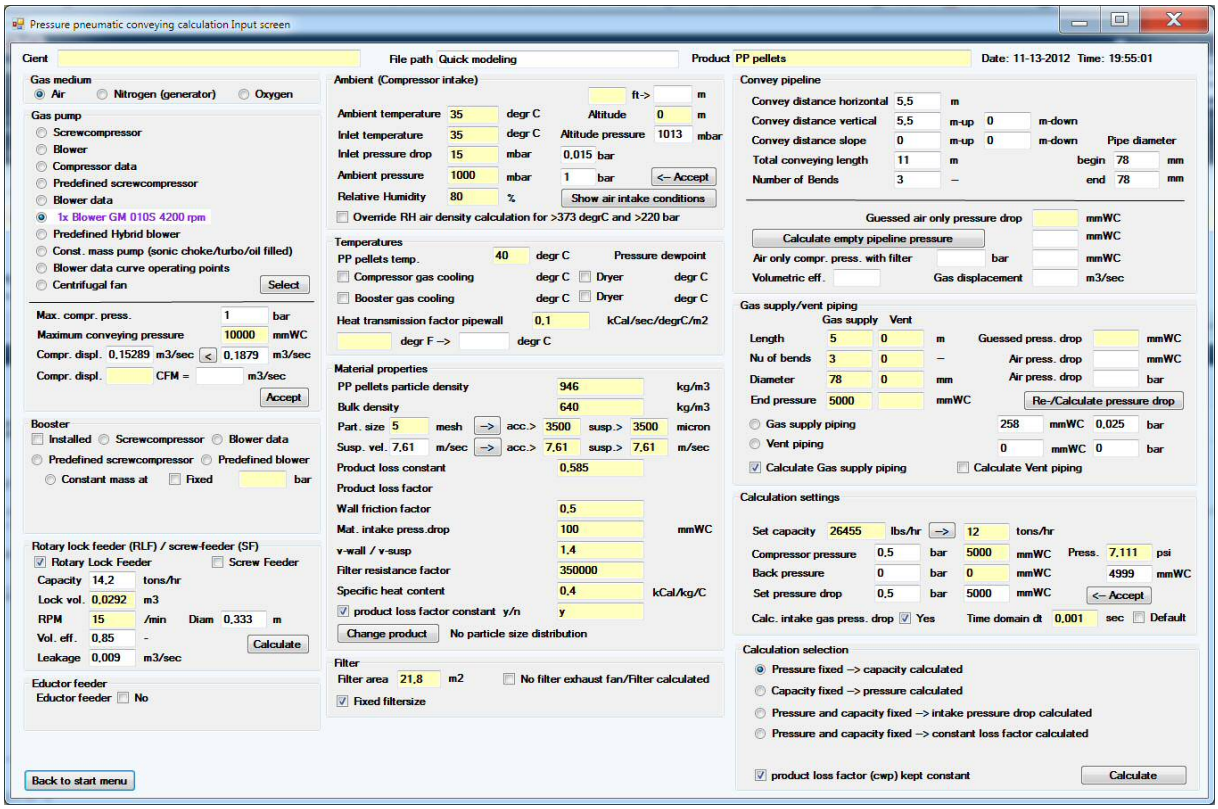
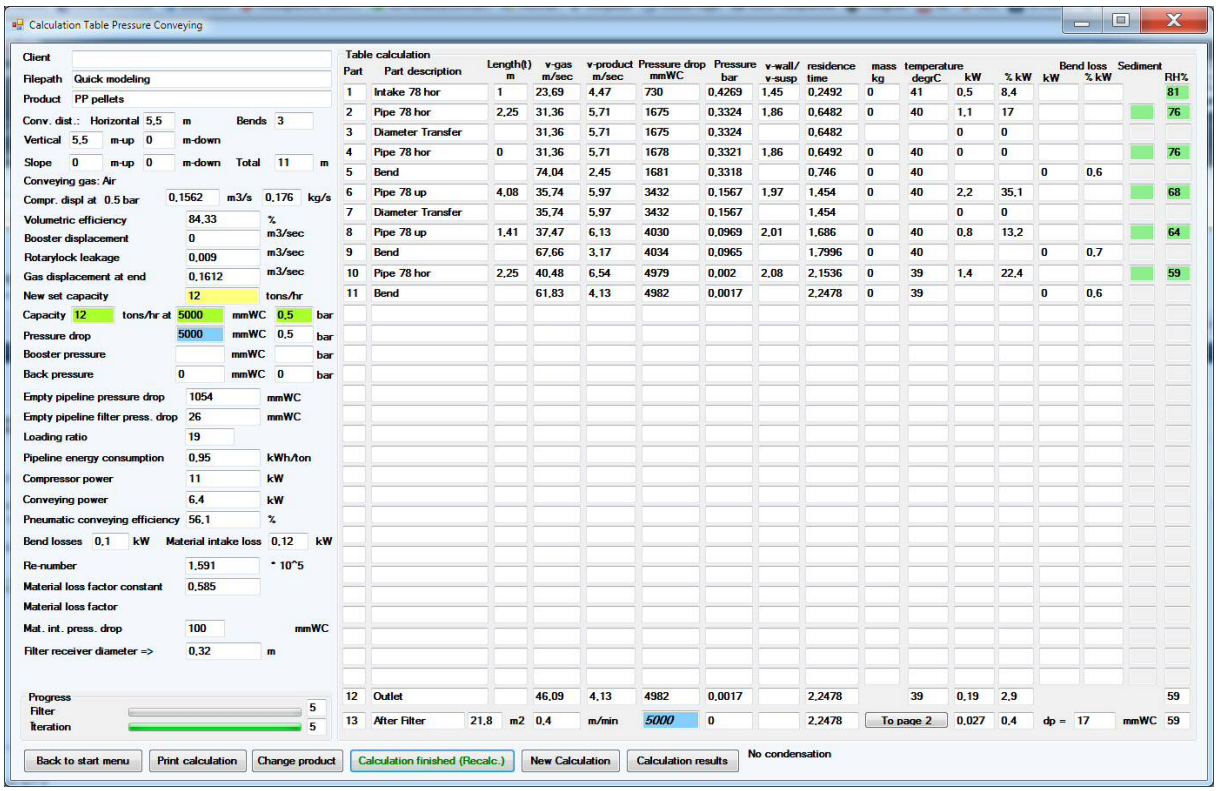
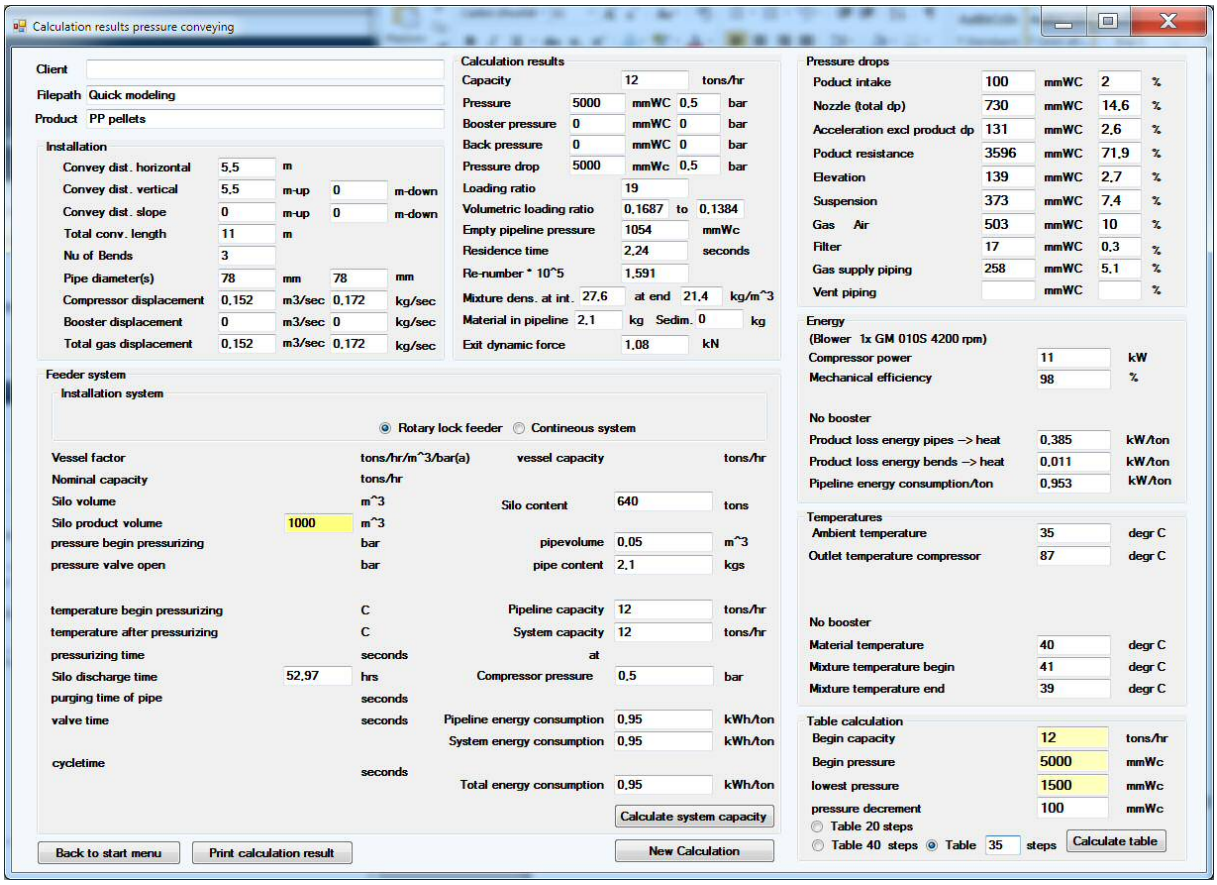

Pressure pneumatic conveying calculation Input screen
Client
File path Quick modeling
Product PP pellets
Date: 11-13-2012 Time: 19:55:01
Gas medium
Air
Nitrogen (generator)
Oxygen
Gas pump
Screwcompressor
Blower
Compressor data
Predefined screwcompressor
Blower data
1x Blower GM 010S 4200 rpm
Predefined Hybrid blower
Const. mass pump (sonic choke/turbo/oil filled)
Blower data curve operating points
Centrifugal fan
Select
Max. compr. press. 1 bar
Maximum conveying pressure 10000 mmWC
Compr. displ. 0,15289 m3/sec < 0,1879 m3/sec
Compr. displ. CFM = m3/sec
Accept
Booster
Installed
Screwcompressor
Blower data
Predefined screwcompressor
Predefined blower
Constant mass at
Fixed
bar
Rotary lock feeder (RLF) / screw-feeder (SF)
Rotary Lock Feeder
Screw Feeder
Capacity 14,2 tons/hr
Lock vol. 0,0292 m3
RPM 15 /min Diam 0,333 m
Vol. eff. 0,85 -
Calculate
Leakage 0,009 m3/sec
Eductor feeder
Eductor feeder No
Back to start menu
Ambient (Compressor intake)
ft-> m
Ambient temperature 35 degr C
Altitude 0 m
Inlet temperature 35 degr C
Altitude pressure 1013 mbar
Inlet pressure drop 15 mbar 0,015 bar
Ambient pressure 1000 mbar 1 bar
<-- Accept
Relative Humidity 80 %
Show air intake conditions
Override RH air density calculation for >373 degrC and >220 bar
Temperatures
PP pellets temp. 40 degr C
Pressure dewpoint
Compressor gas cooling degr C
Dryer degr C
Booster gas cooling degr C
Dryer degr C
Heat transmission factor pipewall 0,1 kCal/sec/degrC/m2
degr F -> degr C
Material properties
PP pellets particle density 946 kg/m3
Bulk density 640 kg/m3
Part. size 5 mesh -> acc.> 3500 susp.> 3500 micron
Susp. vel. 7,61 m/sec -> acc.> 7,61 susp.> 7,61 m/sec
Product loss constant 0,585
Product loss factor
Wall friction factor 0,5
Mat. intake press.drop 100 mmWC
v-wall / v-susp 1,4
Filter resistance factor 350000
Specific heat content 0,4 kCal/kg/C
product loss factor constant y/n y
Change product
No particle size distribution
Filter
Filter area 21,8 m2
No filter exhaust fan/Filter calculated
Fixed filtersize
Convey pipeline
Convey distance horizontal 5,5 m
Convey distance vertical 5,5 m-up 0 m-down
Convey distance slope 0 m-up 0 m-down
Pipe diameter
Total conveying length 11 m
begin 78 mm
Number of Bends 3 –
end 78 mm
Guessed air only pressure drop mmWC
Calculate empty pipeline pressure
mmWC
Air only compr. press. with filter bar mmWC
Volumetric eff. Gas displacement m3/sec
Gas supply/vent piping
Gas supply Vent
Length 5 0 m
Guessed press. drop mmWC
Nu of bends 3 0 –
Air press. drop mmWC
Diameter 78 0 mm
Air press. drop bar
End pressure 5000 mmWC
Re-/Calculate pressure drop
Gas supply piping 258 mmWC 0,025 bar
Vent piping 0 mmWC 0 bar
Calculate Gas supply piping
Calculate Vent piping
Calculation settings
Set capacity 26455 lbs/hr -> 12 tons/hr
Compressor pressure 0,5 bar 5000 mmWC Press. 7,111 psi
Back pressure 0 bar 0 mmWC 4999 mmWC
Set pressure drop 0,5 bar 5000 mmWC
<-- Accept
Calc. intake gas press. drop Yes
Time domain dt 0,001 sec 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
Calculate


Calculation Table Pressure Conveying
Client
Filepath Quick modeling
Product PP pellets
Conv. dist.: Horizontal 5,5 m Bends 3
Vertical 5,5 m-up 0 m-down
Slope 0 m-up 0 m-down Total 11 m
Conveying gas: Air
Compr. displ at 0.5 bar 0,1562 m3/s 0,176 kg/s
Volumetric efficiency 84,33 %
Booster displacement 0 m3/sec
Rotarylock leakage 0,009 m3/sec
Gas displacement at end 0,1612 m3/sec
New set capacity 12 tons/hr
Capacity 12 tons/hr at 5000 mmWC 0,5 bar
Pressure drop 5000 mmWC 0,5 bar
Booster pressure mmWC bar
Back pressure 0 mmWC 0 bar
Empty pipeline pressure drop 1054 mmWC
Empty pipeline filter press. drop 26 mmWC
Loading ratio 19
Pipeline energy consumption 0,95 kWh/ton
Compressor power 11 kW
Conveying power 6,4 kW
Pneumatic conveying efficiency 56,1 %
Bend losses 0,1 kW Material intake loss 0,12 kW
Re-number 1,591 * 10^5
Material loss factor constant 0,585
Material loss factor
Mat. int. press. drop 100 mmWC
Filter receiver diameter => 0,32 m
Progress
Filter 5
Iteration 5
Table calculation
Part Part description Length(t) 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 % kW Sediment RH%
1 Intake 78 hor 1 23,69 4,47 730 0,4269 1,45 0,2492 0 41 0,5 8,4 81
2 Pipe 78 hor 2,25 31,36 5,71 1675 0,3324 1,86 0,6482 0 40 1,1 17 76
3 Diameter Transfer 31,36 5,71 1675 0,3324 0,6482 0 0
4 Pipe 78 hor 0 31,36 5,71 1678 0,3321 1,86 0,6492 0 40 0 0 76
5 Bend 74,04 2,45 1681 0,3318 0,746 0 40 0 0,6
6 Pipe 78 up 4,08 35,74 5,97 3432 0,1567 1,97 1,454 0 40 2,2 35,1 68
7 Diameter Transfer 35,74 5,97 3432 0,1567 1,454 0 0
8 Pipe 78 up 1,41 37,47 6,13 4030 0,0969 2,01 1,686 0 40 0,8 13,2 64
9 Bend 67,66 3,17 4034 0,0965 1,7996 0 40 0 0,7
10 Pipe 78 hor 2,25 40,48 6,54 4979 0,002 2,08 2,1536 0 39 1,4 22,4 59
11 Bend 61,83 4,13 4982 0,0017 2,2478 0 39 0 0,6
12 Outlet 46,09 4,13 4982 0,0017 2,2478 39 0,19 2,9 59
13 After Filter 21,8 m2 0,4 m/min 5000 0 2,2478 To page 2 0,027 0,4 dp = 17 mmWC 59
Back to start menu
Print calculation
Change product
Calculation finished (Recalc.)
New Calculation
Calculation results
No condensation


Calculation results pressure conveying
Client
Filepath Quick modeling
Product PP pellets
Installation
Convey dist. horizontal 5,5 m
Convey dist. vertical 5,5 m-up 0 m-down
Convey dist. slope 0 m-up 0 m-down
Total conv. length 11 m
Nu of Bends 3
Pipe diameter(s) 78 mm 78 mm
Compressor displacement 0,152 m3/sec 0,172 kg/sec
Booster displacement 0 m3/sec 0 kg/sec
Total gas displacement 0,152 m3/sec 0,172 kg/sec
Calculation results
Capacity 12 tons/hr
Pressure 5000 mmWC 0,5 bar
Booster pressure 0 mmWC 0 bar
Back pressure 0 mmWC 0 bar
Pressure drop 5000 mmWc 0,5 bar
Loading ratio 19
Volumetric loading ratio 0,1687 to 0,1384
Empty pipeline pressure 1054 mmWc
Residence time 2,24 seconds
Re-number * 10^5 1,591
Mixture dens. at int. 27,6 at end 21,4 kg/m^3
Material in pipeline 2,1 kg Sedim. 0 kg
Exit dynamic force 1,08 kN
Pressure drops
Poduct intake 100 mmWC 2 %
Nozzle (total dp) 730 mmWC 14,6 %
Acceleration excl product dp 131 mmWC 2,6 %
Poduct resistance 3596 mmWC 71,9 %
Elevation 139 mmWC 2,7 %
Suspension 373 mmWC 7,4 %
Gas Air 503 mmWC 10 %
Filter 17 mmWC 0,3 %
Gas supply piping 258 mmWC 5,1 %
Vent piping mmWC %
Energy
(Blower 1x GM 010S 4200 rpm)
Compressor power 11 kW
Mechanical efficiency 98 %
No booster
Product loss energy pipes --> heat 0,385 kW/ton
Product loss energy bends --> heat 0,011 kW/ton
Pipeline energy consumption/ton 0,953 kW/ton
Temperatures
Ambient temperature 35 degr C
Outlet temperature compressor 87 degr C
No booster
Material temperature 40 degr C
Mixture temperature begin 41 degr C
Mixture temperature end 39 degr C
Feeder system
Installation system
Rotary lock feeder
Contineous system
Vessel factor tons/hr/m^3/bar(a)
Nominal capacity tons/hr
Silo volume m^3
Silo product volume 1000 m^3
pressure begin pressurizing bar
pressure valve open bar
temperature begin pressurizing C
temperature after pressurizing C
pressurizing time seconds
Silo discharge time 52,97 hrs
purging time of pipe seconds
valve time seconds
cycletime seconds
vessel capacity tons/hr
Silo content 640 tons
pipevolume 0,05 m^3
pipe content 2,1 kgs
Pipeline capacity 12 tons/hr
System capacity 12 tons/hr
at
Compressor pressure 0,5 bar
Pipeline energy consumption 0,95 kWh/ton
System energy consumption 0,95 kWh/ton
Total energy consumption 0,95 kWh/ton
Calculate system capacity
Table calculation
Begin capacity 12 tons/hr
Begin pressure 5000 mmWc
lowest pressure 1500 mmWc
pressure decrement 100 mmWc
Table 20 steps
Table 40 steps
Table 35 steps
Calculate table
Back to start menu
Print calculation result
New Calculation

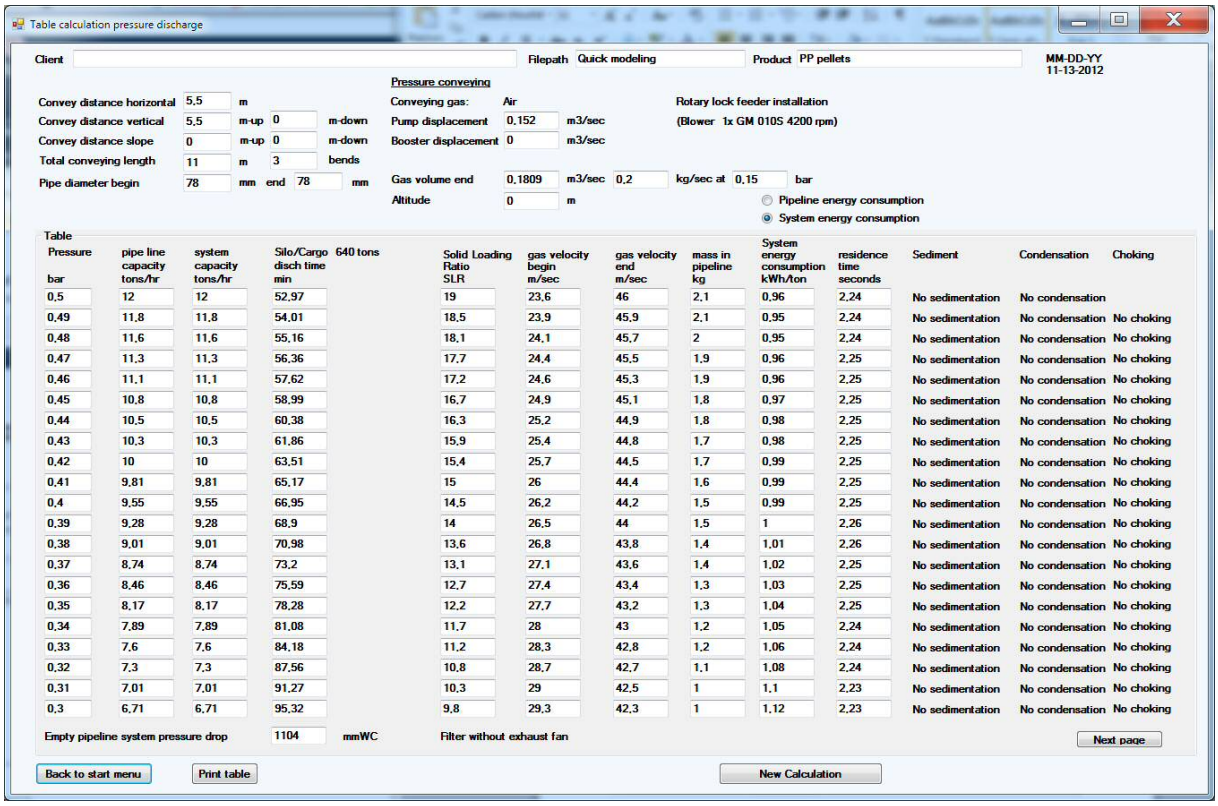
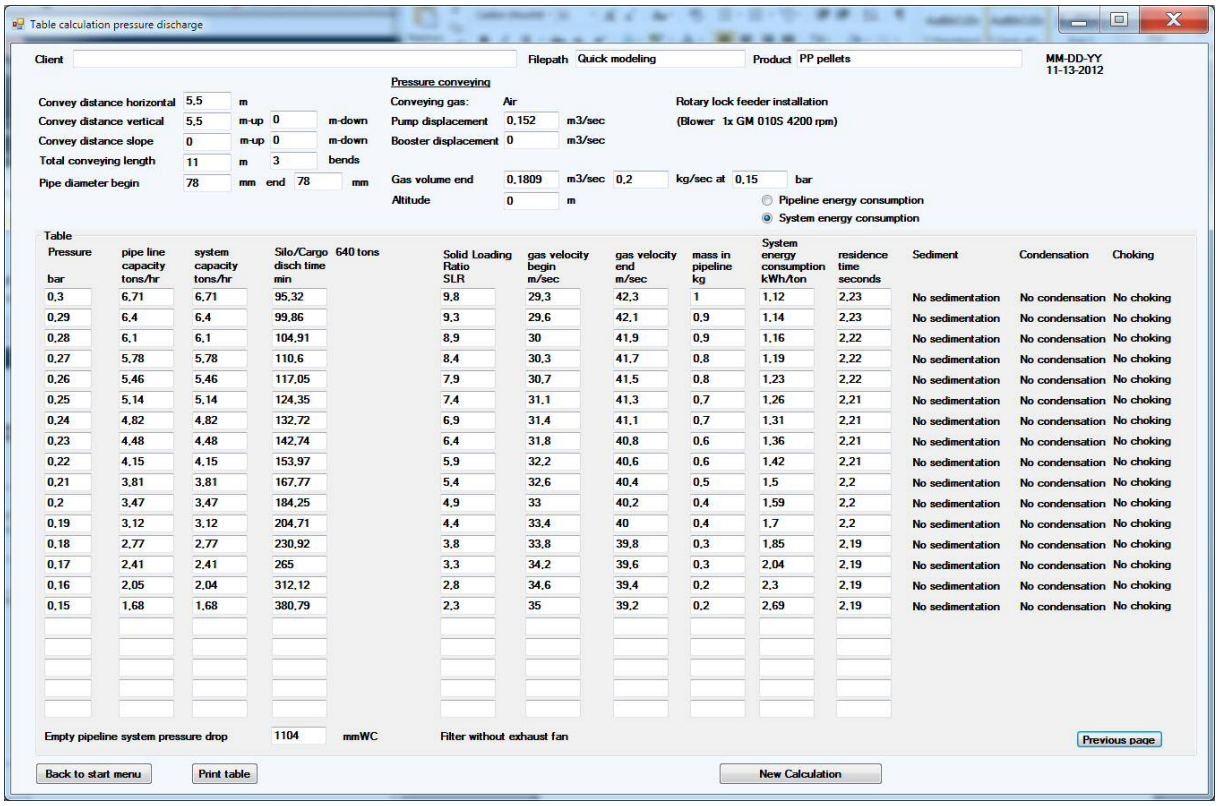


Table calculation pressure discharge
Client
Filepath Quick modeling
Product PP pellets
MM-DD-YY
11-13-2012
Pressure conveying
Convey distance horizontal 5,5 m
Convey distance vertical 5,5 m-up 0 m-down
Convey distance slope 0 m-up 0 m-down
Total conveying length 11 m 3 bends
Pipe diameter begin 78 mm end 78 mm
Conveying gas: Air
Pump displacement 0,152 m3/sec
Booster displacement 0 m3/sec
Gas volume end 0,1809 m3/sec 0,2 kg/sec at 0,15 bar
Altitude 0 m
Rotary lock feeder installation
(Blower 1x GM 010S 4200 rpm)
Pipeline energy consumption
System energy consumption
Table
Pressure bar | pipe line capacity tons/hr | system capacity tons/hr | Silo/Cargo disch time 640 tons min | Solid Loading Ratio SLR | gas velocity begin m/sec | gas velocity end m/sec | mass in pipeline kg | System energy consumption kWh/ton | residence time seconds | Sediment | Condensation | Choking
0,5 | 12 | 12 | 52,97 | 19 | 23,6 | 46 | 2,1 | 0,96 | 2,24 | No sedimentation | No condensation
0,49 | 11,8 | 11,8 | 54,01 | 18,5 | 23,9 | 45,9 | 2,1 | 0,95 | 2,24 | No sedimentation | No condensation | No choking
0,48 | 11,6 | 11,6 | 55,16 | 18,1 | 24,1 | 45,7 | 2 | 0,95 | 2,24 | No sedimentation | No condensation | No choking
0,47 | 11,3 | 11,3 | 56,36 | 17,7 | 24,4 | 45,5 | 1,9 | 0,96 | 2,25 | No sedimentation | No condensation | No choking
0,46 | 11,1 | 11,1 | 57,62 | 17,2 | 24,6 | 45,3 | 1,9 | 0,96 | 2,25 | No sedimentation | No condensation | No choking
0,45 | 10,8 | 10,8 | 58,99 | 16,7 | 24,9 | 45,1 | 1,8 | 0,97 | 2,25 | No sedimentation | No condensation | No choking
0,44 | 10,5 | 10,5 | 60,38 | 16,3 | 25,2 | 44,9 | 1,8 | 0,98 | 2,25 | No sedimentation | No condensation | No choking
0,43 | 10,3 | 10,3 | 61,86 | 15,9 | 25,4 | 44,8 | 1,7 | 0,98 | 2,25 | No sedimentation | No condensation | No choking
0,42 | 10 | 10 | 63,51 | 15,4 | 25,7 | 44,5 | 1,7 | 0,99 | 2,25 | No sedimentation | No condensation | No choking
0,41 | 9,81 | 9,81 | 65,17 | 15 | 26 | 44,4 | 1,6 | 0,99 | 2,25 | No sedimentation | No condensation | No choking
0,4 | 9,55 | 9,55 | 66,95 | 14,5 | 26,2 | 44,2 | 1,5 | 0,99 | 2,25 | No sedimentation | No condensation | No choking
0,39 | 9,28 | 9,28 | 68,9 | 14 | 26,5 | 44 | 1,5 | 1 | 2,26 | No sedimentation | No condensation | No choking
0,38 | 9,01 | 9,01 | 70,98 | 13,6 | 26,8 | 43,8 | 1,4 | 1,01 | 2,26 | No sedimentation | No condensation | No choking
0,37 | 8,74 | 8,74 | 73,2 | 13,1 | 27,1 | 43,6 | 1,4 | 1,02 | 2,25 | No sedimentation | No condensation | No choking
0,36 | 8,46 | 8,46 | 75,59 | 12,7 | 27,4 | 43,4 | 1,3 | 1,03 | 2,25 | No sedimentation | No condensation | No choking
0,35 | 8,17 | 8,17 | 78,28 | 12,2 | 27,7 | 43,2 | 1,3 | 1,04 | 2,25 | No sedimentation | No condensation | No choking
0,34 | 7,89 | 7,89 | 81,08 | 11,7 | 28 | 43 | 1,2 | 1,05 | 2,24 | No sedimentation | No condensation | No choking
0,33 | 7,6 | 7,6 | 84,18 | 11,2 | 28,3 | 42,8 | 1,2 | 1,06 | 2,24 | No sedimentation | No condensation | No choking
0,32 | 7,3 | 7,3 | 87,56 | 10,8 | 28,7 | 42,7 | 1,1 | 1,08 | 2,24 | No sedimentation | No condensation | No choking
0,31 | 7,01 | 7,01 | 91,27 | 10,3 | 29 | 42,5 | 1 | 1,1 | 2,23 | No sedimentation | No condensation | No choking
0,3 | 6,71 | 6,71 | 95,32 | 9,8 | 29,3 | 42,3 | 1 | 1,12 | 2,23 | No sedimentation | No condensation | No choking
Empty pipeline system pressure drop 1104 mmWC
Filter without exhaust fan
Next page
Back to start menu
Print table
New Calculation



Pressure bar	pipe line capacity tons/hr	system capacity tons/hr	Silo/Cargo disch time 640 tons min	Solid Loading Ratio SLR	gas velocity begin m/sec	gas velocity end m/sec	mass in pipeline kg	System energy consumption kWh/ton	residence time seconds	Sediment	Condensation	Choking
0,3	6,71	6,71	95,32	9,8	29,3	42,3	1	1,12	2,23	No sedimentation	No condensation	No choking
0,29	6,4	6,4	99,86	9,3	29,6	42,1	0,9	1,14	2,23	No sedimentation	No condensation	No choking
0,28	6,1	6,1	104,91	8,9	30	41,9	0,9	1,16	2,22	No sedimentation	No condensation	No choking
0,27	5,78	5,78	110,6	8,4	30,3	41,7	0,8	1,19	2,22	No sedimentation	No condensation	No choking
0,26	5,46	5,46	117,05	7,9	30,7	41,5	0,8	1,23	2,22	No sedimentation	No condensation	No choking
0,25	5,14	5,14	124,35	7,4	31,1	41,3	0,7	1,26	2,21	No sedimentation	No condensation	No choking
0,24	4,82	4,82	132,72	6,9	31,4	41,1	0,7	1,31	2,21	No sedimentation	No condensation	No choking
0,23	4,48	4,48	142,74	6,4	31,8	40,8	0,6	1,36	2,21	No sedimentation	No condensation	No choking
0,22	4,15	4,15	153,97	5,9	32,2	40,6	0,6	1,42	2,21	No sedimentation	No condensation	No choking
0,21	3,81	3,81	167,77	5,4	32,6	40,4	0,5	1,5	2,2	No sedimentation	No condensation	No choking
0,2	3,47	3,47	184,25	4,9	33	40,2	0,4	1,59	2,2	No sedimentation	No condensation	No choking
0,19	3,12	3,12	204,71	4,4	33,4	40	0,4	1,7	2,2	No sedimentation	No condensation	No choking
0,18	2,77	2,77	230,92	3,8	33,8	39,8	0,3	1,85	2,19	No sedimentation	No condensation	No choking
0,17	2,41	2,41	265	3,3	34,2	39,6	0,3	2,04	2,19	No sedimentation	No condensation	No choking
0,16	2,05	2,04	312,12	2,8	34,6	39,4	0,2	2,3	2,19	No sedimentation	No condensation	No choking
0,15	1,68	1,68	380,79	2,3	35	39,2	0,2	2,69	2,19	No sedimentation	No condensation	No choking