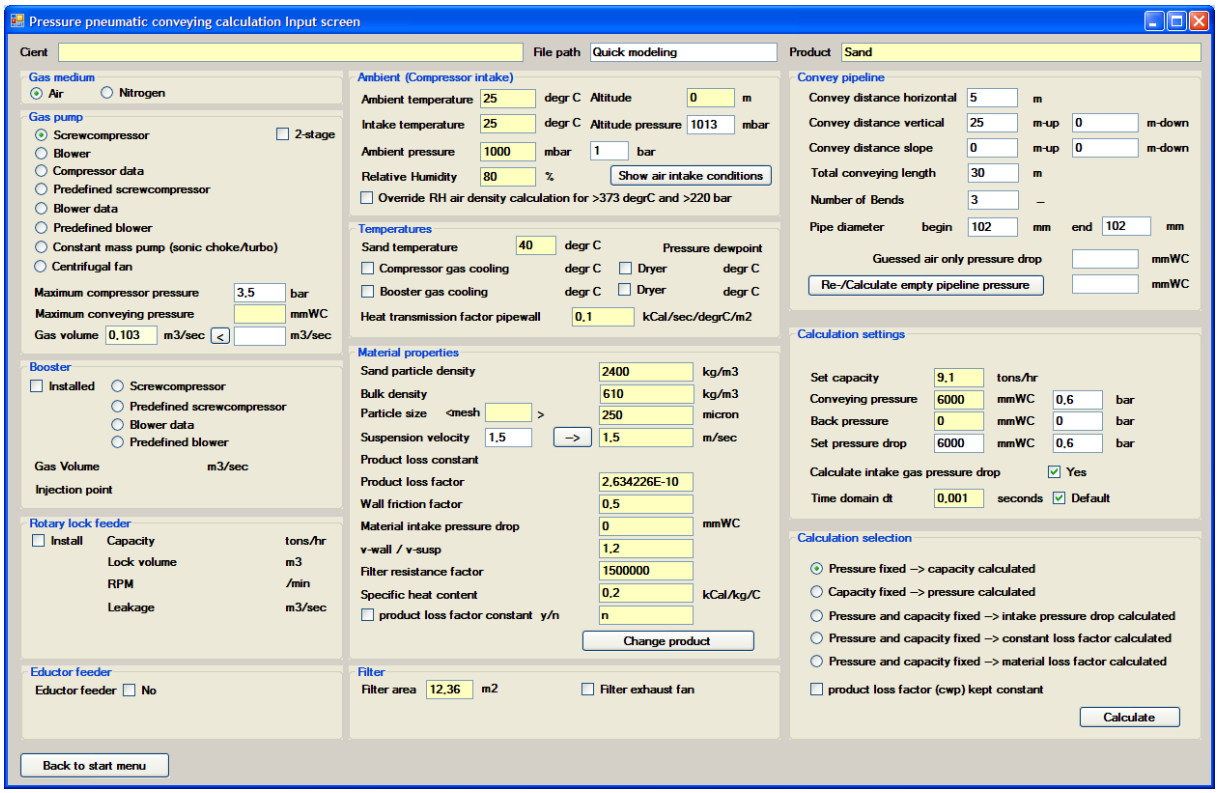
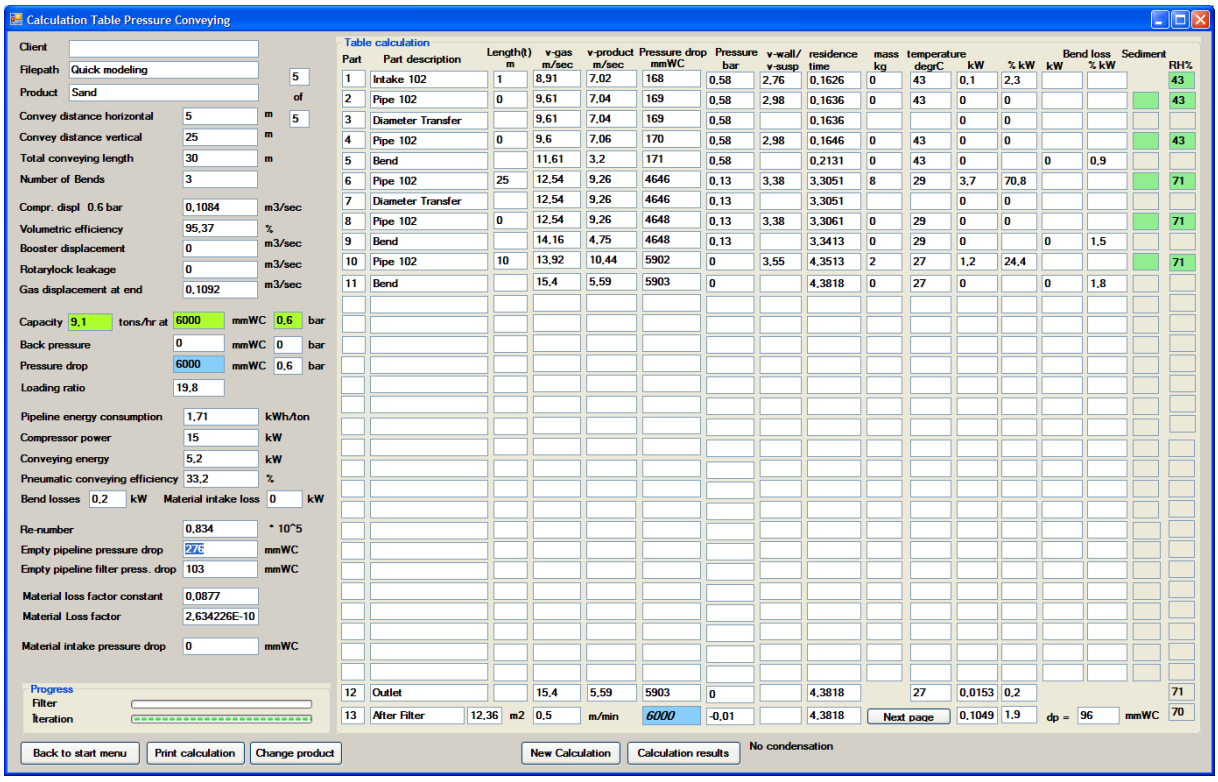
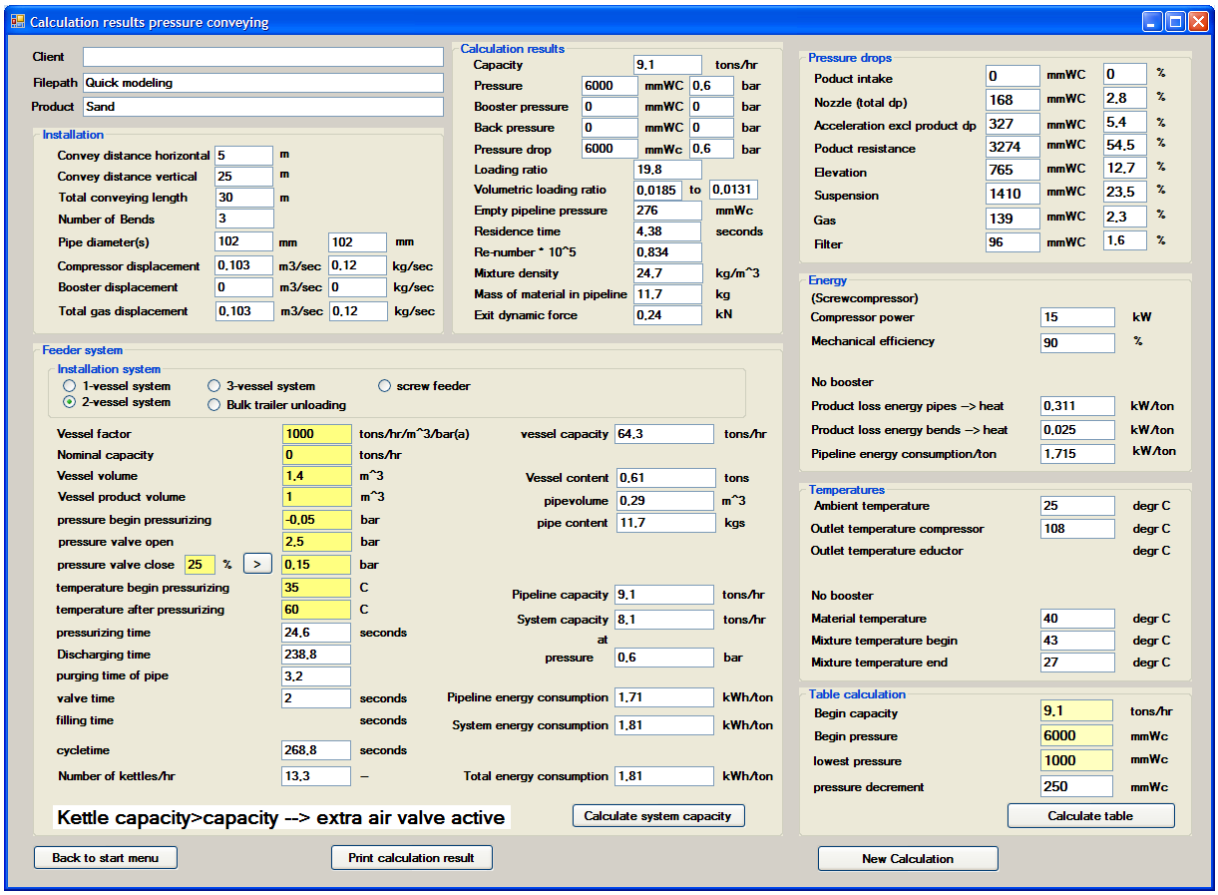

Pressure pneumatic conveying calculation Input screen
Client
File path
Quick modeling
Product
Sand
Gas medium
Air
Nitrogen
Gas pump
Screwcompressor
2-stage
Blower
Compressor data
Predefined screwcompressor
Blower data
Predefined blower
Constant mass pump (sonic choke/turbo)
Centrifugal fan
Maximum compressor pressure
3,5
bar
Maximum conveying pressure
mmWC
Gas volume
0,103
m3/sec
m3/sec
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
Eductor feeder
Eductor feeder
No
Ambient (Compressor intake)
Ambient temperature
25
degr C
Altitude
0
m
Intake temperature
25
degr C
Altitude pressure
1013
mbar
Ambient pressure
1000
mbar
1
bar
Relative Humidity
80
%
Show air intake conditions
Override RH air density calculation for >373 degrC and >220 bar
Temperatures
Sand temperature
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
Material properties
Sand particle density
2400
kg/m3
Bulk density
610
kg/m3
Particle size
<mesh
>
250
micron
Suspension velocity
1,5
->
1,5
m/sec
Product loss constant
Product loss factor
2,634226E-10
Wall friction factor
0,5
Material intake pressure drop
0
mmWC
v-wall / v-susp
1,2
Filter resistance factor
1500000
Specific heat content
0,2
kCal/kg/C
product loss factor constant y/n
n
Change product
Filter
Filter area
12,36
m2
Filter exhaust fan
Convey pipeline
Convey distance horizontal
5
m
Convey distance vertical
25
m-up
0
m-down
Convey distance slope
0
m-up
0
m-down
Total conveying length
30
m
Number of Bends
3
–
Pipe diameter
begin
102
mm
end
102
mm
Guessed air only pressure drop
mmWC
Re-/Calculate empty pipeline pressure
mmWC
Calculation settings
Set capacity
9,1
tons/hr
Conveying pressure
6000
mmWC
0,6
bar
Back pressure
0
mmWC
0
bar
Set pressure drop
6000
mmWC
0,6
bar
Calculate intake gas pressure drop
Yes
Time domain dt
0,001
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
Pressure and capacity fixed –> material loss factor calculated
product loss factor (cwp) kept constant
Calculate
Back to start menu


Calculation Table Pressure Conveying
Client
Filepath
Quick modeling
Product
Sand
Convey distance horizontal
5
m
Convey distance vertical
25
m
Total conveying length
30
m
Number of Bends
3
Compr. displ 0.6 bar
0,1084
m3/sec
Volumetric efficiency
95,37
%
Booster displacement
0
m3/sec
Rotarylock leakage
0
m3/sec
Gas displacement at end
0,1092
m3/sec
Capacity
9,1
tons/hr at
6000
mmWC
0,6
bar
Back pressure
0
mmWC
0
bar
Pressure drop
6000
mmWC
0,6
bar
Loading ratio
19,8
Pipeline energy consumption
1,71
kWh/ton
Compressor power
15
kW
Conveying energy
5,2
kW
Pneumatic conveying efficiency
33,2
%
Bend losses
0,2
kW
Material intake loss
0
kW
Re-number
0,834
* 10^5
Empty pipeline pressure drop
276
mmWC
Empty pipeline filter press. drop
103
mmWC
Material loss factor constant
0,0877
Material Loss factor
2,634226E-10
Material intake pressure drop
0
mmWC
Progress
Filter
Iteration
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 102 1 8,91 7,02 168 0,58 2,76 0,1626 0 43 0,1 2,3 43
2 Pipe 102 0 9,61 7,04 169 0,58 2,98 0,1636 0 43 0 0 43
3 Diameter Transfer 9,61 7,04 169 0,58 0,1636 0 0
4 Pipe 102 0 9,6 7,06 170 0,58 2,98 0,1646 0 43 0 0 43
5 Bend 11,61 3,2 171 0,58 0,2131 0 43 0 0 0,9
6 Pipe 102 25 12,54 9,26 4646 0,13 3,38 3,3051 8 29 3,7 70,8 71
7 Diameter Transfer 12,54 9,26 4646 0,13 3,3051 0 0
8 Pipe 102 0 12,54 9,26 4648 0,13 3,38 3,3061 0 29 0 0 71
9 Bend 14,16 4,75 4648 0,13 3,3413 0 29 0 0 1,5
10 Pipe 102 10 13,92 10,44 5902 0 3,55 4,3513 2 27 1,2 24,4 71
11 Bend 15,4 5,59 5903 0 4,3818 0 27 0 0 1,8
12 Outlet 15,4 5,59 5903 0 4,3818 27 0,0153 0,2 71
13 After Filter 12,36 m2 0,5 m/min 6000 -0,01 4,3818 Next page 0,1049 1,9 dp = 96 mmWC 70
Back to start menu
Print calculation
Change product
New Calculation
Calculation results
No condensation


Calculation results pressure conveying
Client
Filepath Quick modeling
Product Sand
Installation
Convey distance horizontal 5 m
Convey distance vertical 25 m
Total conveying length 30 m
Number of Bends 3
Pipe diameter(s) 102 mm 102 mm
Compressor displacement 0,103 m3/sec 0,12 kg/sec
Booster displacement 0 m3/sec 0 kg/sec
Total gas displacement 0,103 m3/sec 0,12 kg/sec
Calculation results
Capacity 9,1 tons/hr
Pressure 6000 mmWC 0,6 bar
Booster pressure 0 mmWC 0 bar
Back pressure 0 mmWC 0 bar
Pressure drop 6000 mmWc 0,6 bar
Loading ratio 19,8
Volumetric loading ratio 0,0185 to 0,0131
Empty pipeline pressure 276 mmWc
Residence time 4,38 seconds
Re-number * 10^5 0,834
Mixture density 24,7 kg/m^3
Mass of material in pipeline 11,7 kg
Exit dynamic force 0,24 kN
Pressure drops
Poduct intake 0 mmWC 0 %
Nozzle (total dp) 168 mmWC 2,8 %
Acceleration excl product dp 327 mmWC 5,4 %
Poduct resistance 3274 mmWC 54,5 %
Elevation 765 mmWC 12,7 %
Suspension 1410 mmWC 23,5 %
Gas 139 mmWC 2,3 %
Filter 96 mmWC 1,6 %
Energy
(Screwcompressor)
Compressor power 15 kW
Mechanical efficiency 90 %
No booster
Product loss energy pipes --> heat 0,311 kW/ton
Product loss energy bends --> heat 0,025 kW/ton
Pipeline energy consumption/ton 1,715 kW/ton
Temperatures
Ambient temperature 25 degr C
Outlet temperature compressor 108 degr C
Outlet temperature eductor degr C
No booster
Material temperature 40 degr C
Mixture temperature begin 43 degr C
Mixture temperature end 27 degr C
Feeder system
Installation system
1-vessel system
2-vessel system
3-vessel system
Bulk trailer unloading
screw feeder
Vessel factor 1000 tons/hr/m^3/bar(a)
Nominal capacity 0 tons/hr
Vessel volume 1,4 m^3
Vessel product volume 1 m^3
pressure begin pressurizing -0,05 bar
pressure valve open 2,5 bar
pressure valve close 25 % > 0,15 bar
temperature begin pressurizing 35 C
temperature after pressurizing 60 C
pressurizing time 24,6 seconds
Discharging time 238,8
purging time of pipe 3,2
valve time 2 seconds
filling time seconds
cycletime 268,8 seconds
Number of kettles/hr 13,3 –
vessel capacity 64,3 tons/hr
Vessel content 0,61 tons
pipevolume 0,29 m^3
pipe content 11,7 kgs
Pipeline capacity 9,1 tons/hr
System capacity 8,1 tons/hr
at
pressure 0,6 bar
Pipeline energy consumption 1,71 kWh/ton
System energy consumption 1,81 kWh/ton
Total energy consumption 1,81 kWh/ton
Kettle capacity>capacity --> extra air valve active
Calculate system capacity
Table calculation
Begin capacity 9,1 tons/hr
Begin pressure 6000 mmWc
lowest pressure 1000 mmWc
pressure decrement 250 mmWc
Calculate table
Back to start menu
Print calculation result
New Calculation

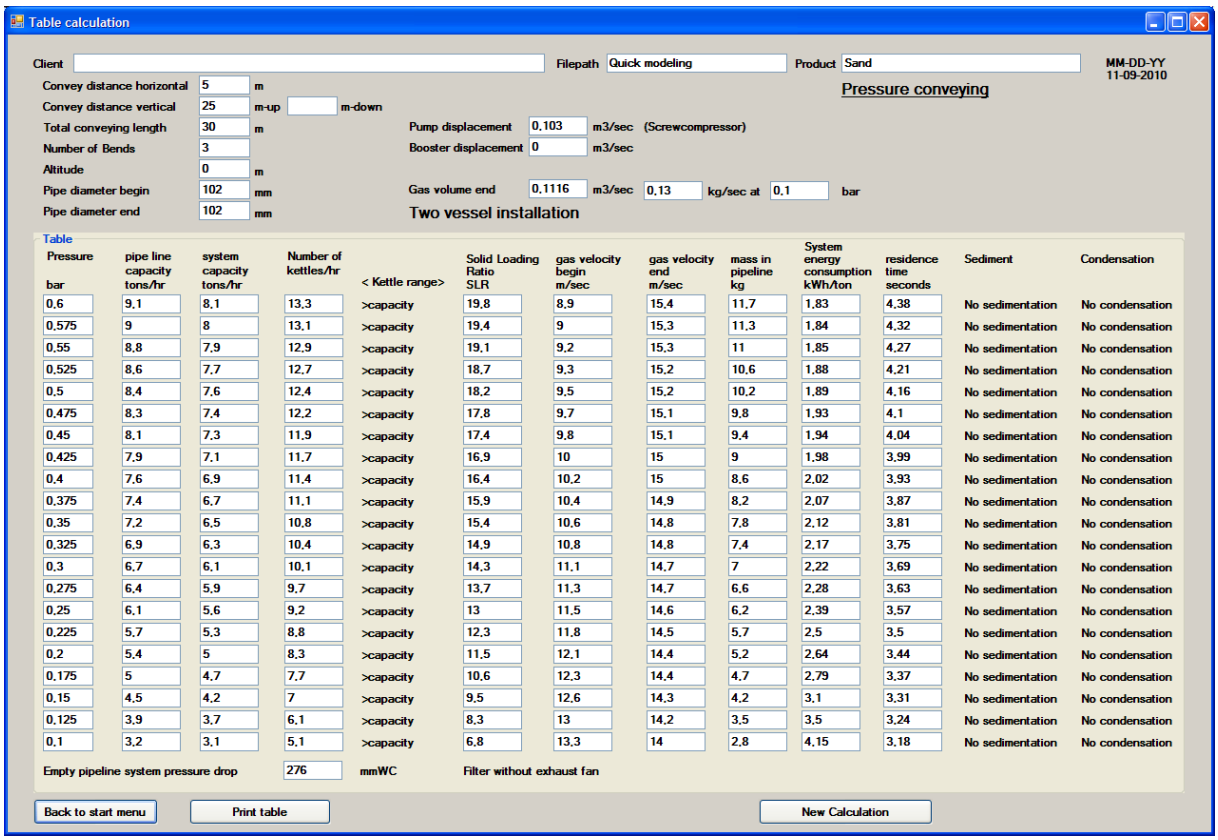


Table calculation
Client
Filepath Quick modeling
Product Sand
MM-DD-YY
11-09-2010
Pressure conveying
Convey distance horizontal 5 m
Convey distance vertical 25 m-up m-down
Total conveying length 30 m
Number of Bends 3
Altitude 0 m
Pipe diameter begin 102 mm
Pipe diameter end 102 mm
Pump displacement 0,103 m3/sec (Screwcompressor)
Booster displacement 0 m3/sec
Gas volume end 0,1116 m3/sec 0,13 kg/sec at 0,1 bar
Two vessel installation
Table
Pressure bar | pipe line capacity tons/hr | system capacity tons/hr | Number of kettles/hr | < Kettle range> | 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
0,6 | 9,1 | 8,1 | 13,3 | >capacity | 19,8 | 8,9 | 15,4 | 11,7 | 1,83 | 4,38 | No sedimentation | No condensation
0,575 | 9 | 8 | 13,1 | >capacity | 19,4 | 9 | 15,3 | 11,3 | 1,84 | 4,32 | No sedimentation | No condensation
0,55 | 8,8 | 7,9 | 12,9 | >capacity | 19,1 | 9,2 | 15,3 | 11 | 1,85 | 4,27 | No sedimentation | No condensation
0,525 | 8,6 | 7,7 | 12,7 | >capacity | 18,7 | 9,3 | 15,2 | 10,6 | 1,88 | 4,21 | No sedimentation | No condensation
0,5 | 8,4 | 7,6 | 12,4 | >capacity | 18,2 | 9,5 | 15,2 | 10,2 | 1,89 | 4,16 | No sedimentation | No condensation
0,475 | 8,3 | 7,4 | 12,2 | >capacity | 17,8 | 9,7 | 15,1 | 9,8 | 1,93 | 4,1 | No sedimentation | No condensation
0,45 | 8,1 | 7,3 | 11,9 | >capacity | 17,4 | 9,8 | 15,1 | 9,4 | 1,94 | 4,04 | No sedimentation | No condensation
0,425 | 7,9 | 7,1 | 11,7 | >capacity | 16,9 | 10 | 15 | 9 | 1,98 | 3,99 | No sedimentation | No condensation
0,4 | 7,6 | 6,9 | 11,4 | >capacity | 16,4 | 10,2 | 15 | 8,6 | 2,02 | 3,93 | No sedimentation | No condensation
0,375 | 7,4 | 6,7 | 11,1 | >capacity | 15,9 | 10,4 | 14,9 | 8,2 | 2,07 | 3,87 | No sedimentation | No condensation
0,35 | 7,2 | 6,5 | 10,8 | >capacity | 15,4 | 10,6 | 14,8 | 7,8 | 2,12 | 3,81 | No sedimentation | No condensation
0,325 | 6,9 | 6,3 | 10,4 | >capacity | 14,9 | 10,8 | 14,8 | 7,4 | 2,17 | 3,75 | No sedimentation | No condensation
0,3 | 6,7 | 6,1 | 10,1 | >capacity | 14,3 | 11,1 | 14,7 | 7 | 2,22 | 3,69 | No sedimentation | No condensation
0,275 | 6,4 | 5,9 | 9,7 | >capacity | 13,7 | 11,3 | 14,7 | 6,6 | 2,28 | 3,63 | No sedimentation | No condensation
0,25 | 6,1 | 5,6 | 9,2 | >capacity | 13 | 11,5 | 14,6 | 6,2 | 2,39 | 3,57 | No sedimentation | No condensation
0,225 | 5,7 | 5,3 | 8,8 | >capacity | 12,3 | 11,8 | 14,5 | 5,7 | 2,5 | 3,5 | No sedimentation | No condensation
0,2 | 5,4 | 5 | 8,3 | >capacity | 11,5 | 12,1 | 14,4 | 5,2 | 2,64 | 3,44 | No sedimentation | No condensation
0,175 | 5 | 4,7 | 7,7 | >capacity | 10,6 | 12,3 | 14,4 | 4,7 | 2,79 | 3,37 | No sedimentation | No condensation
0,15 | 4,5 | 4,2 | 7 | >capacity | 9,5 | 12,6 | 14,3 | 4,2 | 3,1 | 3,31 | No sedimentation | No condensation
0,125 | 3,9 | 3,7 | 6,1 | >capacity | 8,3 | 13 | 14,2 | 3,5 | 3,5 | 3,24 | No sedimentation | No condensation
0,1 | 3,2 | 3,1 | 5,1 | >capacity | 6,8 | 13,3 | 14 | 2,8 | 4,15 | 3,18 | No sedimentation | No condensation
Empty pipeline system pressure drop 276 mmWC
Filter without exhaust fan
Back to start menu
Print table
New Calculation