

Helix Technologies Pty Ltd

Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Network Type	Gas	Calc. Method	Modified Darcy
Description	Landfill Gas System - Ringmain		

A typical Landfill Gas Collection system pipe design based on a ringmain configuration.

Depth of waste is 15m and maximum spacing between wells ~ 3 x depth of waste = 45m, therefore used spacing of 40m with ROI (Radius of influence) of each well is ~ 20m.

Each well requires a minimum vacuum of 10 inches of H₂O which is approximately 2.5kPa. Site elevation is 550m above sea level and atmospheric pressure is 95kPa (see Network Details button above for atmospheric pressure calculation). Therefore set the inlet pressure at the well to 95 - 2.5kPa = 92.5kPa. Specific gas yield is 120-200 m³/y per 1 ton of MSW and if compacted density is taken as 600kg/m³ the yield will be $18850\text{m}^3 \times 0.6 \times 160 / 365 / 24 = 206 \text{ m}^3/\text{hr}$.

Flow rate required from each well is calculated from rule above. Volume of influence for each well is $\text{Pi} \cdot \text{R}^2 \times \text{depth} = \text{Pi} \times 20^2 \times 15 = 18850\text{m}^3$ of waste per well therefore flow rate of gas per well is 206m³/hr . Gas temperature is 130 deg F ~ 54 deg C. Enter gas temperature in deg C.

Each well has a perforated riser pipe of Polyethylene PE 100 Class PN16 pipe 110mm diameter with 89mm ID 10m long followed by unperforated pipe and butterfly valve and 3 x 90 deg bends. This well pipe is modelled separately below the main ring main in order to determine the head loss in the well and headworks and this piping is added to each branch from well to ringmain.

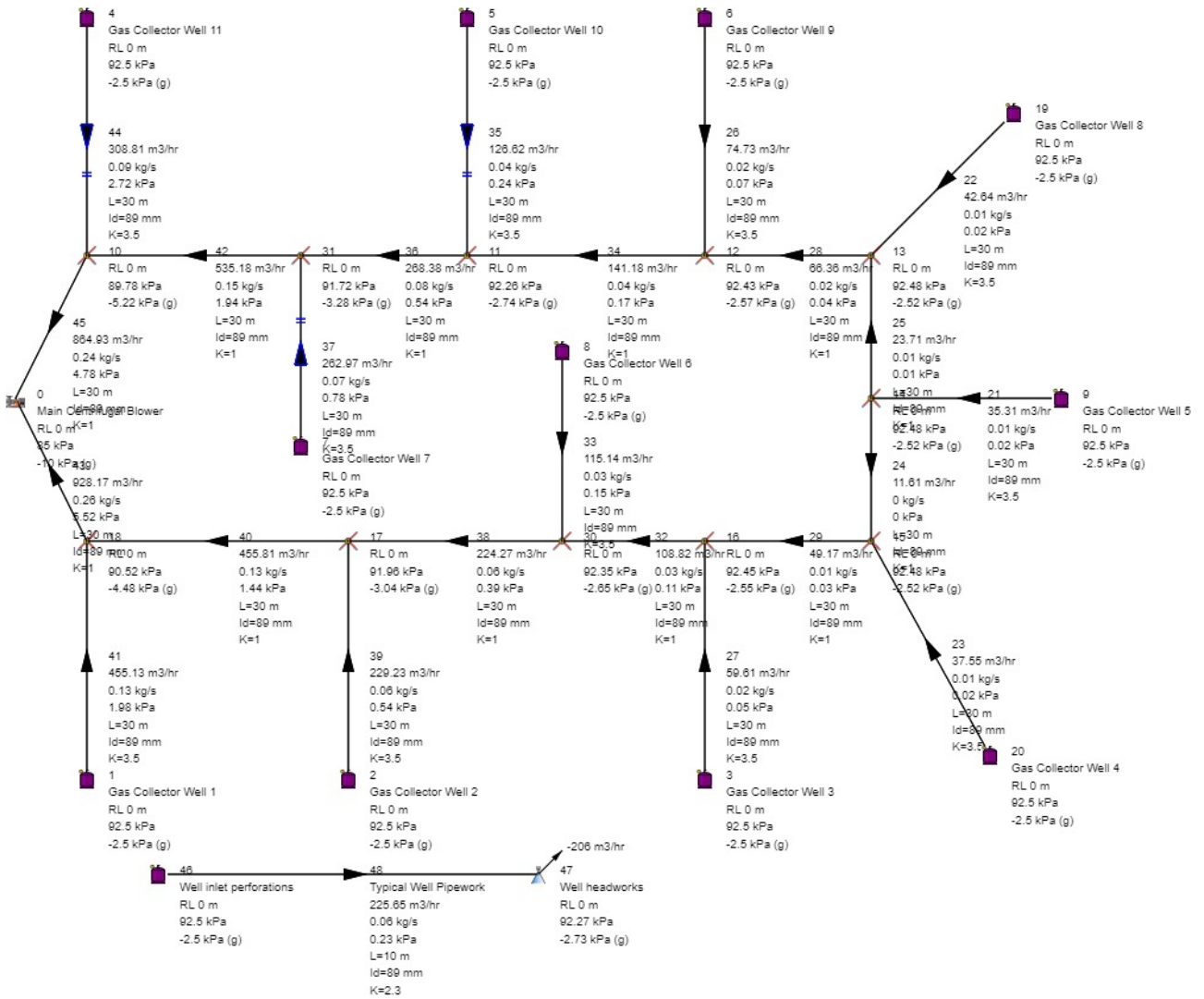
The flow at the furthest well is much lower than the wells closer to the blower, so to control the flow from each well a valve is used to choke the flow. The valve is modelled as fitting K value in the branch pipe to each well. In each case the k value is adjusted to give a flow rate of about 206 m³/hr from each well. Alternatively, the branch pipe diameter can be reduced to increase the losses in the pipe from the well. In this example the branch line no 35 to well no 10 has been reduced in diameter to 50mm in order to control the flow without using a valve to choke. This method is not as flexible as using a control valve.

The network as shown has not been optimised yet, it is shown only at an intermediate point in the design process. For example ringmain pipes 45,42,36 can be increased in diameter to reduce losses as the flow increases towards the blower. The individual well flow rates can be controlled by adding orifice plates, see pipes 35, 37 and 44 for an example.

This is an incomplete stage of the design process.

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Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		



Landfill Gas System - Ringmain

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	21	From node to node	9 - 14
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Pipe Fitting Description		Qty	K value
Butterfly Valve up to 200mm		1	0.9
Bend - 90 degree elbow r/d = 1		3	0.4
Tee - Line to Branch		1	1.2
Entrance - flush		1	0.2
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	35.31 m3/hr	Flow at SMC	28.38 m3/hr
Mass Flow Rate	0.01 kg/s	Velocity	1.58 m/s
Mach number	0		
Friction Loss	0.01 kPa	Fitting Losses	0 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.02 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.48 kPa
Reynolds No.	10659.44	Friction Factor	0.03042 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	22	From node to node	19 - 13
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	42.64 m3/hr	Flow at SMC	34.27 m3/hr
Mass Flow Rate	0.01 kg/s	Velocity	1.9 m/s
Mach number	0		
Friction Loss	0.02 kPa	Fitting Losses	0.01 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.02 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.48 kPa
Reynolds No.	12873.03	Friction Factor	0.02897 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	23	From node to node	20 - 15
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	37.55 m3/hr	Flow at SMC	30.18 m3/hr
Mass Flow Rate	0.01 kg/s	Velocity	1.68 m/s
Mach number	0		
Friction Loss	0.01 kPa	Fitting Losses	0.01 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.02 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.48 kPa
Reynolds No.	11337.51	Friction Factor	0.02994 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	24	From node to node	14 - 15
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	11.61 m3/hr	Flow at SMC	9.32 m3/hr
Mass Flow Rate	0 kg/s	Velocity	0.52 m/s
Mach number	0		
Friction Loss	0 kPa	Fitting Losses	0 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0 kPa		
Entry Total Pressure	92.48 kPa	Exit Total Pressure	92.48 kPa
Reynolds No.	3502.36	Friction Factor	0.04155 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	25	From node to node	14 - 13
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	23.71 m3/hr	Flow at SMC	19.05 m3/hr
Mass Flow Rate	0.01 kg/s	Velocity	1.06 m/s
Mach number	0		
Friction Loss	0.01 kPa	Fitting Losses	0 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.01 kPa		
Entry Total Pressure	92.48 kPa	Exit Total Pressure	92.48 kPa
Reynolds No.	7155.07	Friction Factor	0.03385 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	26	From node to node	6 - 12
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	74.73 m3/hr	Flow at SMC	60.06 m3/hr
Mass Flow Rate	0.02 kg/s	Velocity	3.34 m/s
Mach number	0		
Friction Loss	0.05 kPa	Fitting Losses	0.02 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.07 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.43 kPa
Reynolds No.	22562.48	Friction Factor	0.02521 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	27	From node to node	3 - 16
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	59.61 m3/hr	Flow at SMC	47.91 m3/hr
Mass Flow Rate	0.02 kg/s	Velocity	2.66 m/s
Mach number	0		
Friction Loss	0.03 kPa	Fitting Losses	0.01 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.05 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.45 kPa
Reynolds No.	17997.05	Friction Factor	0.02663 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	28	From node to node	13 - 12
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	66.36 m3/hr	Flow at SMC	53.32 m3/hr
Mass Flow Rate	0.02 kg/s	Velocity	2.96 m/s
Mach number	0		
Friction Loss	0.04 kPa	Fitting Losses	0 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.04 kPa		
Entry Total Pressure	92.48 kPa	Exit Total Pressure	92.43 kPa
Reynolds No.	20024.14	Friction Factor	0.02595 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	29	From node to node	15 - 16
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	49.17 m3/hr	Flow at SMC	39.51 m3/hr
Mass Flow Rate	0.01 kg/s	Velocity	2.2 m/s
Mach number	0		
Friction Loss	0.02 kPa	Fitting Losses	0 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.03 kPa		
Entry Total Pressure	92.48 kPa	Exit Total Pressure	92.45 kPa
Reynolds No.	14837.46	Friction Factor	0.02795 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	32	From node to node	16 - 30
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	108.82 m3/hr	Flow at SMC	87.41 m3/hr
Mass Flow Rate	0.03 kg/s	Velocity	4.86 m/s
Mach number	0		
Friction Loss	0.09 kPa	Fitting Losses	0.01 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.11 kPa		
Entry Total Pressure	92.45 kPa	Exit Total Pressure	92.35 kPa
Reynolds No.	32821.62	Friction Factor	0.02309 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	33	From node to node	8 - 30
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	115.14 m3/hr	Flow at SMC	92.53 m3/hr
Mass Flow Rate	0.03 kg/s	Velocity	5.14 m/s
Mach number	0		
Friction Loss	0.1 kPa	Fitting Losses	0.05 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.15 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.35 kPa
Reynolds No.	34760.25	Friction Factor	0.02279 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	34	From node to node	12 - 11
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	141.18 m3/hr	Flow at SMC	113.38 m3/hr
Mass Flow Rate	0.04 kg/s	Velocity	6.3 m/s
Mach number	0		
Friction Loss	0.15 kPa	Fitting Losses	0.02 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.17 kPa		
Entry Total Pressure	92.43 kPa	Exit Total Pressure	92.26 kPa
Reynolds No.	42560.53	Friction Factor	0.02177 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	35	From node to node	5 - 11
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	15	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	126.62 m3/hr	Flow at SMC	101.76 m3/hr
Mass Flow Rate	0.04 kg/s	Velocity	5.65 m/s
Mach number	0		
Friction Loss	0.12 kPa	Fitting Losses	0.06 kPa
Orifice Losses	0.06 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.24 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.26 kPa
Reynolds No.	38226.37	Friction Factor	0.0223 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	36	From node to node	11 - 31
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	268.38 m3/hr	Flow at SMC	215.14 m3/hr
Mass Flow Rate	0.08 kg/s	Velocity	11.98 m/s
Mach number	0		
Friction Loss	0.47 kPa	Fitting Losses	0.07 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.54 kPa		
Entry Total Pressure	92.26 kPa	Exit Total Pressure	91.72 kPa
Reynolds No.	80610.87	Friction Factor	0.01899 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	37	From node to node	7 - 31
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	20	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	262.97 m3/hr	Flow at SMC	211.34 m3/hr
Mass Flow Rate	0.07 kg/s	Velocity	11.74 m/s
Mach number	0		
Friction Loss	0.46 kPa	Fitting Losses	0.25 kPa
Orifice Losses	0.08 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.78 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	91.72 kPa
Reynolds No.	79391.84	Friction Factor	0.01904 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	38	From node to node	30 - 17
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	224.27 m3/hr	Flow at SMC	179.94 m3/hr
Mass Flow Rate	0.06 kg/s	Velocity	10.01 m/s
Mach number	0		
Friction Loss	0.34 kPa	Fitting Losses	0.05 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.39 kPa		
Entry Total Pressure	92.35 kPa	Exit Total Pressure	91.96 kPa
Reynolds No.	67487.56	Friction Factor	0.0197 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	39	From node to node	2 - 17
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	229.23 m3/hr	Flow at SMC	184.23 m3/hr
Mass Flow Rate	0.06 kg/s	Velocity	10.24 m/s
Mach number	0		
Friction Loss	0.36 kPa	Fitting Losses	0.19 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.54 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	91.96 kPa
Reynolds No.	69206.86	Friction Factor	0.0196 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	40	From node to node	17 - 18
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.01 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.99 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.99 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	0.99
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	455.81 m3/hr	Flow at SMC	364.17 m3/hr
Mass Flow Rate	0.13 kg/s	Velocity	20.35 m/s
Mach number	0		
Friction Loss	1.23 kPa	Fitting Losses	0.21 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	1.44 kPa		
Entry Total Pressure	91.96 kPa	Exit Total Pressure	90.52 kPa
Reynolds No.	136002.16	Friction Factor	0.0171 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	41	From node to node	1 - 18
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	0.99
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	455.13 m3/hr	Flow at SMC	365.77 m3/hr
Mass Flow Rate	0.13 kg/s	Velocity	20.32 m/s
Mach number	0		
Friction Loss	1.25 kPa	Fitting Losses	0.74 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	1.98 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	90.52 kPa
Reynolds No.	137405.44	Friction Factor	0.01707 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	42	From node to node	31 - 10
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.01 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.99 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.99 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	0.99
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	535.18 m3/hr	Flow at SMC	426.47 m3/hr
Mass Flow Rate	0.15 kg/s	Velocity	23.9 m/s
Mach number	0		
Friction Loss	1.65 kPa	Fitting Losses	0.29 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	1.94 kPa		
Entry Total Pressure	91.72 kPa	Exit Total Pressure	89.78 kPa
Reynolds No.	158857.65	Friction Factor	0.0166 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	43	From node to node	18 - 0
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	1 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	1 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	0.97
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	928.17 m3/hr	Flow at SMC	729.94 m3/hr
Mass Flow Rate	0.26 kg/s	Velocity	41.44 m/s
Mach number	0		
Friction Loss	4.66 kPa	Fitting Losses	0.86 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	5.52 kPa		
Entry Total Pressure	90.52 kPa	Exit Total Pressure	85 kPa
Reynolds No.	268330.17	Friction Factor	0.0151 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	44	From node to node	4 - 10
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	0.99
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	10	Non Return Valve	No
Total Fittings k	3.5	Total Fittings kf	0
Flow Rate	308.81 m3/hr	Flow at SMC	248.18 m3/hr
Mass Flow Rate	0.09 kg/s	Velocity	13.79 m/s
Mach number	0		
Friction Loss	0.66 kPa	Fitting Losses	0.34 kPa
Orifice Losses	1.73 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	2.72 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	89.78 kPa
Reynolds No.	93230.07	Friction Factor	0.01843 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	45	From node to node	10 - 0
Description		Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	0.99 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	1.01 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	1.01 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	0.98
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	30 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	864.93 m3/hr	Flow at SMC	674.65 m3/hr
Mass Flow Rate	0.24 kg/s	Velocity	38.62 m/s
Mach number	0		
Friction Loss	4.04 kPa	Fitting Losses	0.74 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	4.78 kPa		
Entry Total Pressure	89.78 kPa	Exit Total Pressure	85 kPa
Reynolds No.	245981.38	Friction Factor	0.01533 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Pipe No	48	From node to node	46 - 47
Description	Typical Well Pipework	Equipment No	
Gas	Landfill gas 50% CH4 plus 50% CO2	Molecular Mass	30 kg/kmol
Ratio Cp/Cv	1.4	Viscosity	0.0137 cP
Temperature	54 C	Density	1.02 kg/m3
Gas SG to Air	1.04	Gas Specific Vol	0.98 m3/kg
Gas Constant R	277.15	Abs. Gas Temp.	0.98 deg K
Flow Condition	Free Flow	Net Exp.Factor Y	1
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	110 mm	Inside Diameter	89 mm
Outside Diameter	110 mm	Pipe Length	10 m
Pipe Roughness	0.003 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Pipe Fitting Description		Qty	K value
Bend - 90 degree elbow r/d = 1		3	0.4
Butterfly Valve up to 200mm		1	0.9
Entrance - flush		1	0.2
Total Fittings k	2.3	Total Fittings kf	0
Flow Rate	225.65 m3/hr	Flow at SMC	181.35 m3/hr
Mass Flow Rate	0.06 kg/s	Velocity	10.08 m/s
Mach number	0		
Friction Loss	0.12 kPa	Fitting Losses	0.12 kPa
Orifice Losses	0 kPa	Fixed Pressure Drop	0 kPa
Total Pressure Drop	0.23 kPa		
Entry Total Pressure	92.5 kPa	Exit Total Pressure	92.27 kPa
Reynolds No.	68125.62	Friction Factor	0.01966 (Darcy f)

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	0	Node Type	Pump
Description	Main Centrifugal Blower	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	85 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	85 kPa
Int.(Gauge) Head	85 kPa		
Pump / Fan Efficiency	70 %	Pump Absorbed Power	0 kW
Casing Pressure	-10 kPa		
Pump NPSH required	0 m	Pump NPSH available	0 m

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	1	Node Type	Tank
Description	Gas Collector Well 1	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	2	Node Type	Tank
Description	Gas Collector Well 2	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	3	Node Type	Tank
Description	Gas Collector Well 3	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	4	Node Type	Tank
Description	Gas Collector Well 11	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	5	Node Type	Tank
Description	Gas Collector Well 10	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	6	Node Type	Tank
Description	Gas Collector Well 9	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	7	Node Type	Tank
Description	Gas Collector Well 7	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	8	Node Type	Tank
Description	Gas Collector Well 6	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	9	Node Type	Tank
Description	Gas Collector Well 5	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	10	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	89.78 kPa
Int.(Gauge) Head	89.78 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	11	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	92.26 kPa
Int.(Gauge) Head	92.26 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	12	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	92.43 kPa
Int.(Gauge) Head	92.43 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	13	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	92.48 kPa
Int.(Gauge) Head	92.48 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	14	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	92.48 kPa
Int.(Gauge) Head	92.48 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	15	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	92.48 kPa
Int.(Gauge) Head	92.48 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	16	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	92.45 kPa
Int.(Gauge) Head	92.45 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	17	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	91.96 kPa
Int.(Gauge) Head	91.96 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	18	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	90.52 kPa
Int.(Gauge) Head	90.52 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	19	Node Type	Tank
Description	Gas Collector Well 8	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		

Node No	20	Node Type	Tank
Description	Gas Collector Well 4	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	30	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	92.35 kPa
Int.(Gauge) Head	92.35 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	31	Node Type	Junction
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	0 m3/hr	Abs. Node Pressure	91.72 kPa
Int.(Gauge) Head	91.72 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	46	Node Type	Tank
Description	Well inlet perforations	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	92.5 kPa
Ext Flow (+In/-Out)	-	Abs. Node Pressure	92.5 kPa
Int.(Gauge) Head	0 kPa		

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Project	New Project	Client	ABC Metals ..
Project No.	4567	Design Date	03/05/2017
Category	Demo Gas	Atmos. Press	95 kPa
Description	Landfill Gas System - Ringmain		
Node No	47	Node Type	Nozzle
Description	Well headworks	Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Ext Flow (+In/-Out)	-206 m3/hr	Abs. Node Pressure	92.27 kPa
Int.(Gauge) Head	92.27 kPa		