

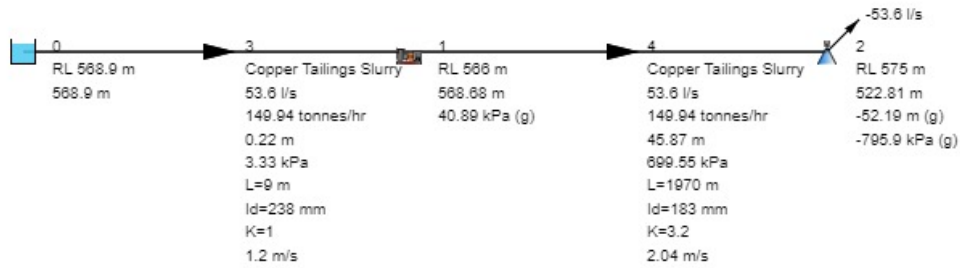
**Helix Technologies Pty Ltd**

Project	Demo QA	Client	Helix Demo QA
Project No.	4567	Design Date	20/06/2017
Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Network Type	Liquid	Calc. Method	Darcy
Description	Copper Mine Tailings Pipeline - Bingham slurry		

Copper Tailings Pipeline - Bingham slurry.

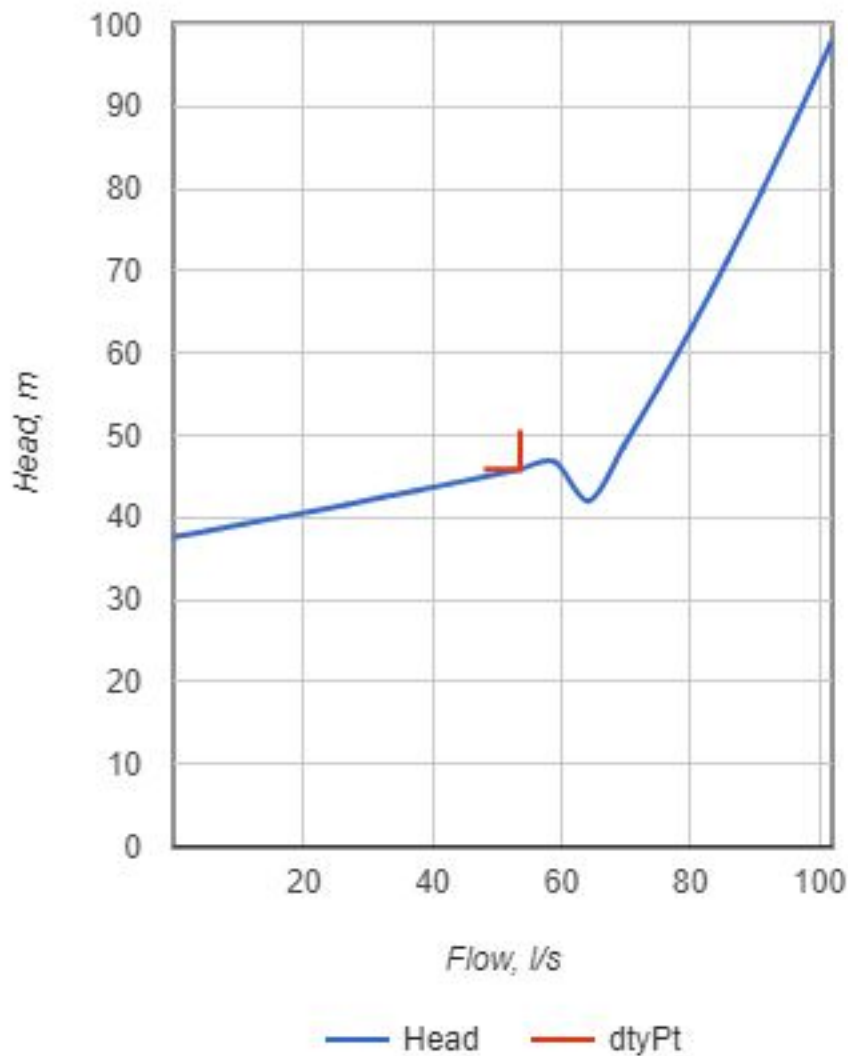
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Copper Mine Tailings Pipeline - Bingham slurry

System Curve Pipe No 4  
183 mm



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Project No.	4567	Design Date	20/06/2017
Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Description	Copper Mine Tailings Pipeline - Bingham slurry		
Pipe No	3	From node to node	0 - 1
Description		Equipment No	
Slurry Type	Bingham Plastic		
Slurry Description	Copper Tailings Slurry	Slurry Reference	Copper Tailings
SG Carrier Liquid Sl	1	Liquid Viscosity	1 cP
SG of Dry Solids	3.5	SG of Mixture	1.56
Conc. by Mass Cw	49.97 % w/w	Concentration by Vol	1.56 % v/v
Solids Flow Rate	149.94 tonnes/hr	Particle Size d50	0.02 mm
Grading	Closely Graded		
Yield Stress	10 Pa	Co-eff of Rigidity n	0.03 Pa-s
Critical Velocity Vc	2.24 m/s	Critical Flow Rate	99.61 l/s
Pump Wear Factor Pw	1	Pump Head Ratio HR	0.97
Pipe Description	Steel Pipe 10" Rubber lined	Pipe Class	
Nominal Diameter	250 mm	Inside Diameter	238 mm
Outside Diameter	273 mm	Pipe Length	9 m
Pipe Roughness	0.025 mm	Allowable Press.	0 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	53.6 l/s	Velocity	1.2 m/s
Friction Loss	0.14 m	Fitting Losses	0.07 m
Slurry Losses	0 m	Orifice Losses	0 m
Fixed Head Loss	0 m	Booster Pump Head	0 m
Total Head Loss	0.22 m	Total Pressure Drop	3.33 kPa
Entry Total Head	568.9 m	Exit Total Head	568.68 m
Entry Gauge Head	0 m	Exit Gauge Head	2.68 m
Reynolds No.	1241.26	Friction Factor	0.05156 (Darcy f)

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Project No.	4567	Design Date	20/06/2017
Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Description	Copper Mine Tailings Pipeline - Bingham slurry		
Pipe No	4	From node to node	1 - 2
Description	Equipment No		
Slurry Type	Bingham Plastic		
Slurry Description	Copper Tailings Slurry	Slurry Reference	Copper Tailings
SG Carrier Liquid Sl	1	Liquid Viscosity	1 cP
SG of Dry Solids	3.5	SG of Mixture	1.56
Conc. by Mass Cw	49.97 % w/w	Concentration by Vol	1.56 % v/v
Solids Flow Rate	149.94 tonnes/hr	Particle Size d50	0.02 mm
Grading	Closely Graded		
Yield Stress	10 Pa	Co-eff of Rigidity n	0.03 Pa-s
Critical Velocity Vc	2.29 m/s	Critical Flow Rate	60.29 l/s
Pump Wear Factor Pw	1	Pump Head Ratio HR	0.97
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	225 mm	Inside Diameter	183 mm
Outside Diameter	225 mm	Pipe Length	1970 m
Pipe Roughness	0.001 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.2	Total Fittings kf	0
Flow Rate	53.6 l/s	Velocity	2.04 m/s
Friction Loss	45.2 m	Fitting Losses	0.68 m
Slurry Losses	0 m	Orifice Losses	0 m
Fixed Head Loss	0 m	Booster Pump Head	0 m
Total Head Loss	45.87 m	Total Pressure Drop	699.55 kPa
Entry Total Head	568.68 m	Exit Total Head	522.81 m
Entry Gauge Head	2.68 m	Exit Gauge Head	-52.19 m
Reynolds No.	3227.72	Friction Factor	0.01983 (Darcy f)

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Project No.	4567	Design Date	20/06/2017
Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Description	Copper Mine Tailings Pipeline - Bingham slurry		
Node No	0	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	568.9 m	Pressure Input	0 kPa
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	568.9 m		

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Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Description	Copper Mine Tailings Pipeline - Bingham slurry		
Node No	1	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	566 m	Pressure Input	0 kPa
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	568.68 m		
Pump Head	0 m	Pump Flow Rate	53.6 l/s
Pump / Fan Efficiency	70 %	Pump Absorbed Power	0 kW
Casing Pressure	40.89 kPa		
Pump NPSH required	0 m	Pump NPSH available	8.82 m

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Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Description	Copper Mine Tailings Pipeline - Bingham slurry		
Node No	2	Node Type	Nozzle
Description		Equipment No	
Rel. Level (RL)	575 m	Pressure Input	0 kPa
Nozzle K value	0	Ext Flow (+In/-Out)	-53.6 l/s
Int.(Gauge) Head	-52.19 m	Int.(Gauge) Pressure	-795.9 kPa
Total Node Head	522.81 m		