Helix Technologies Pty Ltd

Project	Helix QA	Client	Helix QA
Project No.	4567	Design Date	15/03/2017
Category	Demo Liquid QA	Atmos. Press	100.19 bar
Network Type	Liquid	Calc. Method	Darcy
Description	Water Heating Coil Crane 410M ex 4-11 pg 4-6		

Oil Flow ref. 'Flow of Fuids Through Valves, Fittings and Pipe', Crane Technical Paper 410 M
Example 4-11 pg 4-6
Water at 80 C flows at 60 l/min through a heating coil with 7 x 180 deg bends and 2 x 90 deg bends. Pipe is 1" Sch 40, 5.4m long. Determine the pressure drop. This Helix model uses the Kft method for the fitting loss calculations with details entered as per example and listed below.

Fitting Description	Kft	K	Qty	
Bend - 90 degree elbow	14	0.32	2	Switch on the 'use Kft' switch on pipe details
Bend - 180 degree r=100mm	30	0.553	7	

Calculation Results	Crane 410	Helix
Pressure Drop bar	0.152	0.1533
Reynolds no	1.33 x 10^5	1.329 x 10^5
Friction factor	0.023	0.02208

Excellent Correlation. The Helix model has drawn a single straight pipe to represent the coils, you could also draw it with multiple pipes in a looped formation as per sketch in Crane 410. Results will be the same.

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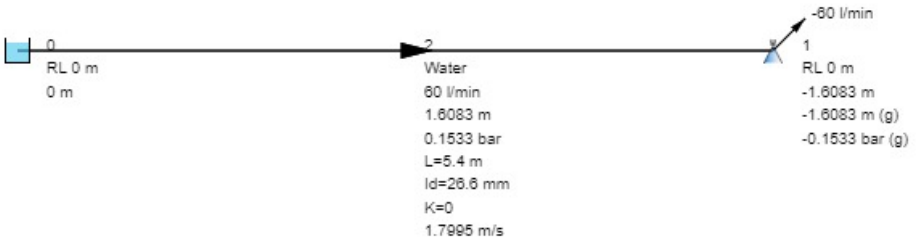

Water Heating Coil Crane 410M ex 4-11 pg 4-6

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Pipe No	2	From node to node	0 - 1
Description		Equipment No	
Liquid	Water	Viscosity	0.35 cp
Temperature	80 C	Density	971.8 kg/m3
Vapour Pressure	49.2 bar		
Pipe Description	Steel Pipes 1" AS1836 (ANSI B36.10)	Pipe Class	Sch 40
Nominal Diameter	25 mm	Inside Diameter	26.6 mm
Outside Diameter	33.4 mm	Pipe Length	5.4 m
Pipe Roughness	0.03 mm	Allowable Press.	12100 bar
Orifice Plate Dia	-	Non Return Valve	No

Pipe Fitting Description	Qty	K value	Kft value
Bend - 90 degree elbow	2	0.32	14
Bend - 180 degree r=100mm	7	0.553	30

Total Fittings k	0	Total Fittings kf	238
Flow Rate	60 l/min	Velocity	1.7995 m/s
Friction Loss	0.7406 m	Fitting Losses	0.8677 m
Slurry Losses	0 m	Orifice Losses	0 m
Fixed Head Loss	0 m	Booster Pump Head	0 m
Total Head Loss	1.6083 m	Total Pressure Drop	0.1533 bar
Entry Total Head	0 m	Exit Total Head	-1.6083 m
Entry Gauge Head	0 m	Exit Gauge Head	-1.6083 m
Reynolds No.	132903.7798	Friction Factor	0.0220836 (Darcy f)

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Node No	0	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 bar
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	0 m		

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Node No	1	Node Type	Nozzle
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 bar
Nozzle K value	0	Ext Flow (+In/-Out)	-60 l/min
Int.(Gauge) Head	-1.6083 m	Int.(Gauge) Pressure	-0.1533 bar
Total Node Head	-1.6083 m		