K-Line™ Irrigation

Design Manual .... The grass is always greener

an Aliaxis company

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RX PLASTICS

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Why K-Line Irrigation is so good?

The major benefits are:

- Low initial cost with lower operating costs
- Ease of installation, use, and shifting
- Works well on all types of soils, terrain and shapes of fields
- With K-line sprinklers, the water penetrates deep into the soil with little or no run-off - like a soft rain (slow absorbtion method) every precious litre goes further
- The K-Line sprinkler pods are moved when the system is operating - shifting is very fast with an ATV (usually no more than 3 minutes per line)
- The K-Line system is available with pressure compensating sprinklers which results in very good uniformity even in very hilly applications
- K-Line irrigation is designed to fit the field (not the field altered to fit the irrigation) - can be designed around obstructions - results in large initial cost savings

Other features are:

- Wide selection of nozzle sizes
- Application rates of 25mm to 80mm of water per week
- Shifting is not a lot of work (done most commonly with a 4-wheeled ATV, but can be moved with an available tractor or other vehicle) anybody can do it!!
- Works well in fields up to 360 metres in length (suits properties from 1-1000 hectares)
- High pressure is not needed - the best pressure range for K-Line sprinklers is 40-55 psi, but works well down to 35 psi (2.5bar)
- The K-Line system is very durable - the one piece K-line pods are heavy duty as are the special K-Line plastic fittings
- The special heavy walled 32mm and 40mm K-Line tubing is made mostly of low density polyethylene resin that withstands the effects of freezing and sunlight, while remaining flexible and strong
- Shifting usually is done once a day at a convenient time for the operator
- The K-Line system can be easily moved out of the field for mowing, cultivating, harvesting, or for winter storage
- Livestock is not affected - in fact they like to graze around the operating sprinklers (especially on hot days)

K Line - Design Detail

- Each Pod 600 litres per hour @ 45 psi (3Bar)

- Pods spaced at 15 metres along the Low Density and moved 15 metres each shift

  each pod covers 15m x 15m = 225m² per day

- 24 Hour shifts 600 l/hr / 225m²
  = 2.67mm/hour x 24 hours
  = 64mm / day

- 14 day cycle = 64(mm/day) / 14(days) x 7 days
  = 32mm / week (average)
  (assuming 24hr/day operation)

  and each pod covers 225m² x 14 days
  = 3150m2or 0.315 Ha

- 10 day cycle = 64(mm/day) / 10(days) x 7 days
  = 44.8mm / week (average)
  (assuming 24hr/day operation)

  and each pod covers 225m² x 10 days
  = 2250m²or 0.225 Ha

K Line - Example

- Block is 300 metres x 105 metres = 3.15 Ha

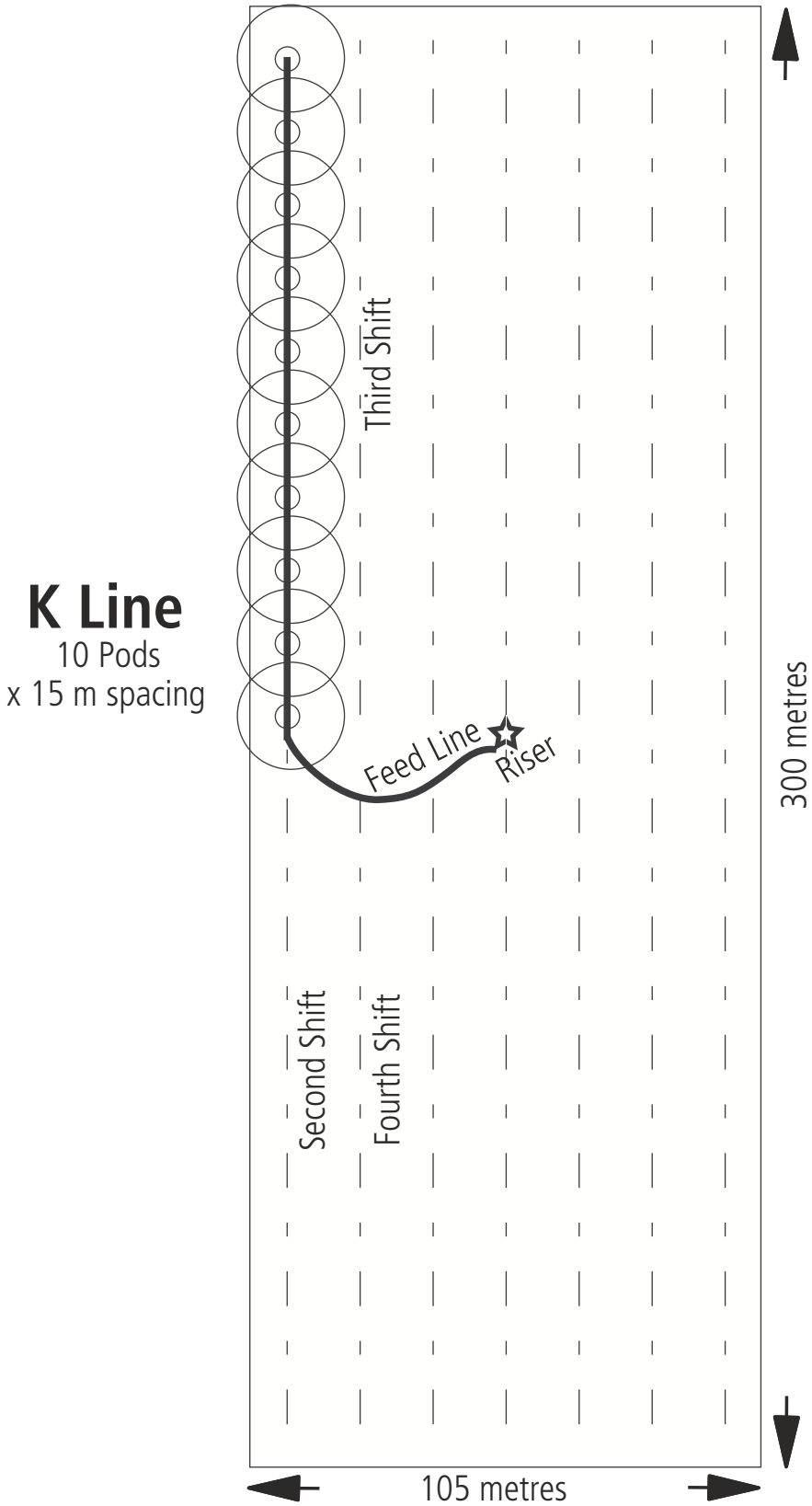
  K Line Sprinkler coverage = 150m
  150m / 15m = 10 sprinklers
  (First to last sprinkler) = 135 metres
  K Line moved 15 metres each 24 hours
  Each sprinkler 600 litres/ hour @ 45psi (Naan)

  Number of moves = 105 metres(block width) / 15 metre shifts
  = 7 shifts x 2 ends of paddock
  = 14 shifts (days)

  Application rates = 64mm per day / 14 days x 7 days
  = 32mm /week average

NB: Selection of 14 day cycle and an application rate of 32mm /week depends on soil type and climatic conditions. The soil must have some available water for the plant after 14 days.

K Line - Detail of Shifts



K Line - Pipe Design

- Sprinkler Line 135m
- 135m would be 32mm Low Density Poly
- Input pressure to the line would 33m (47psi, 3.3bar)
- Flow would be approximately 6.0m3/hr
- Feed Line would be 55m of 40mm Low Density
  Pressure loss would be ~ 3.8m (5.4psi)

Therefore the pressure at the Riser would need to be approx
~ 36.8m (52.4psi) @ 6.0 m3/hr

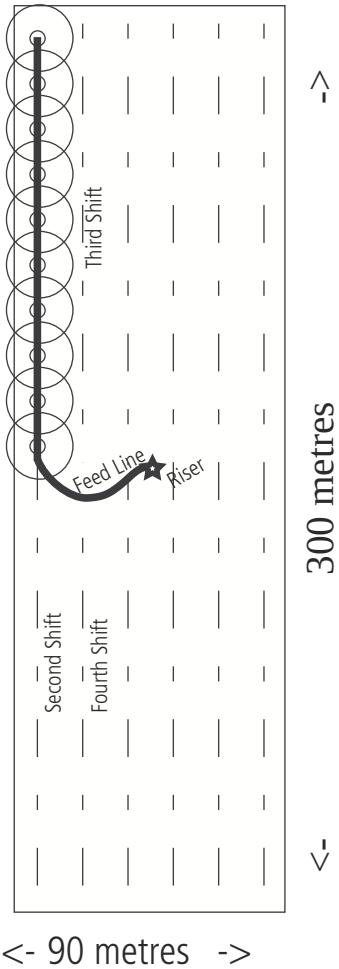
The system is usually reticulated through a mains and thiswould add 10-30psi.

Therefore the total would normally be 70~80 psi which is below the 6.3 Bar rating of the Medium Density Pipe usually used or the PN6 rating of uPVC pipe systems.

K Line - Examples

Six Day Scenario - Option One

K Line
10 Pods
x 15 m spacing



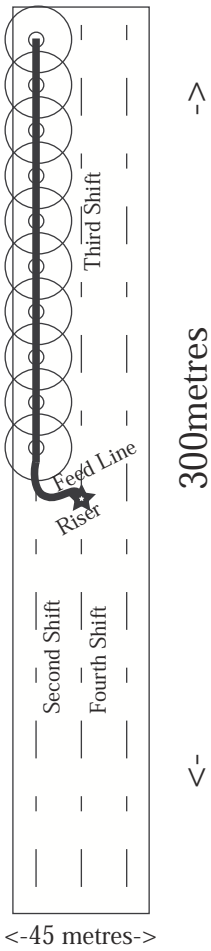
Application

Naan Orange Nozzle	= 51mm/24 hours
(2 Bar minimum pressure)	= 12 shifts = 51mm/24hours*12 hour operation
	= 25.5mm/application (29.75mm/week Avg)
Naan Red Nozzle	= 65mm/24 hours
(2.5 Bar minimum pressure)	= 12 shifts = 65mm/24hours*12 hour operation
	= 32.5mm/application (37.9mm/week Avg)
Naan Blue Nozzle	= 90mm/24 hours
(3 Bar minimum pressure)	= 12 shifts = 90mm/24hours*8 hour operation
	= 30.2mm/application (35.2mm/week Avg)

K Line - Examples

Six Day Scenario - Option Two

K Line
10 Pods
x 15 m spacing



One shifts per day

Therefore : 6 shifts to the start

Area = 45m x 300m = 1.35Ha

Three shifts per end of the block
= 3 x 15m = 45m

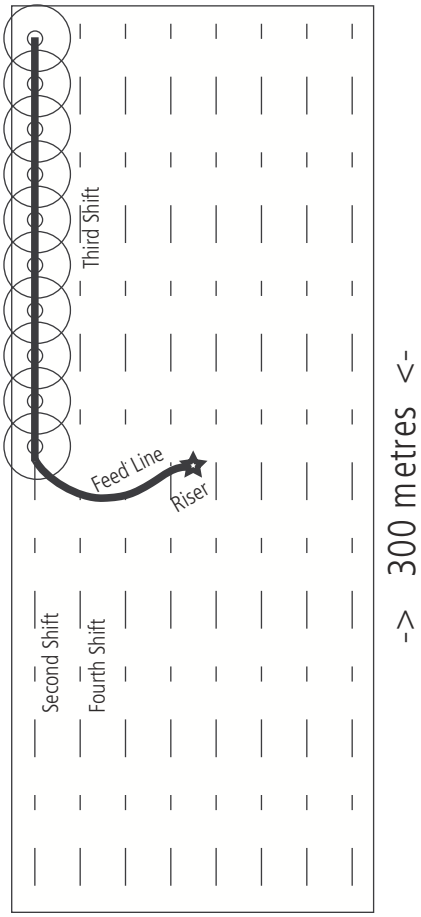
Application

Naan Orange Nozzle	= 51mm/24 hours
(2 Bar minimum pressure)	= 6 shifts = 51mm/24hours*15 hour operation
	= 31.8mm/application (37mm/week Avg)
Naan Red Nozzle	= 65mm/24 hours
(2.5 Bar minimum pressure)	= 6 shifts = 65mm/24hours*12 hour operation
	= 32.5mm/application (37.9mm/week Avg)
Naan Blue Nozzle	= 90mm/24 hours
(3 Bar minimum pressure)	= 6 shifts = 90mm/24hours*8 hour operation
	= 30.2mm/application (35.2mm/week Avg)

K Line - Examples

Eight Day Scenario - Option One

K Line
10 Pods
x 15 m spacing



Two shifts per day

2 shifts per 24 hour period
Therefere : 16 shifts to start

Area = 120m x 300m = 3.6Ha

Eight shifts per end of the block
= 8 x 15m = 120m

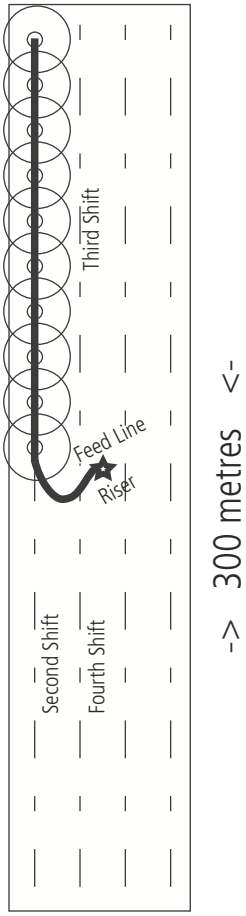
Application

Naan Red Nozzle	= 65mm/24 hours
(2.5 Bar minimum pressure)	= 16 shifts = 65mm/24hours*12 hour operation
	= 32.5mm/application (28.5mm/week Avg)
Naan Blue Nozzle	= 84mm/24 hours
(2.5 Bar minimum pressure)	= 16 shifts = 84mm/24hours*12 hour operation
	= 42mm/application (36.75mm/week Avg)
Naan Black Nozzle	= 114.3mm/24 hours
(3 Bar minimum pressure)	= 16 shifts = 114.3mm/24hours*8 hour operation
	= 38.1mm/application (33.3mm/week Avg)

K Line - Examples

Eight Day Scenario - Option Two

K Line
10 Pods
x 15 m spacing



<-60 metres->

One shift per day

Therefere : 8 shifts to start

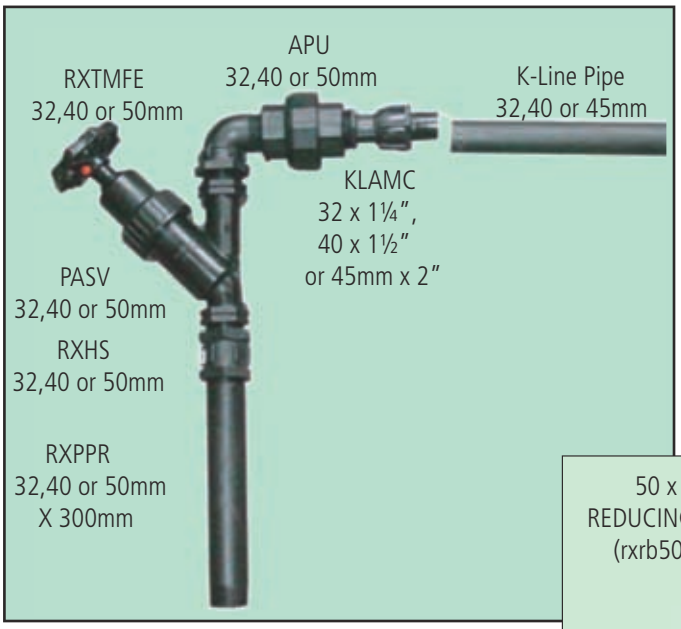
Area = 60m x 300m = 1.8Ha

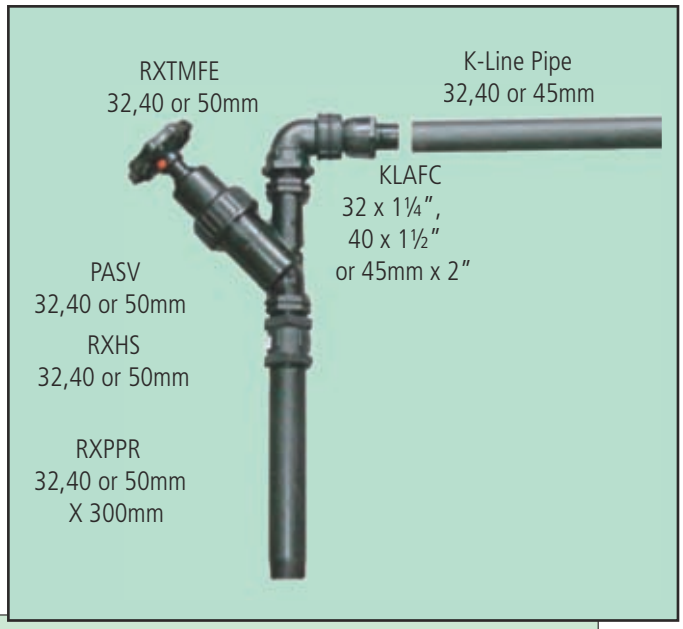
Four shifts per end of the block
= 4 x 15m = 60m

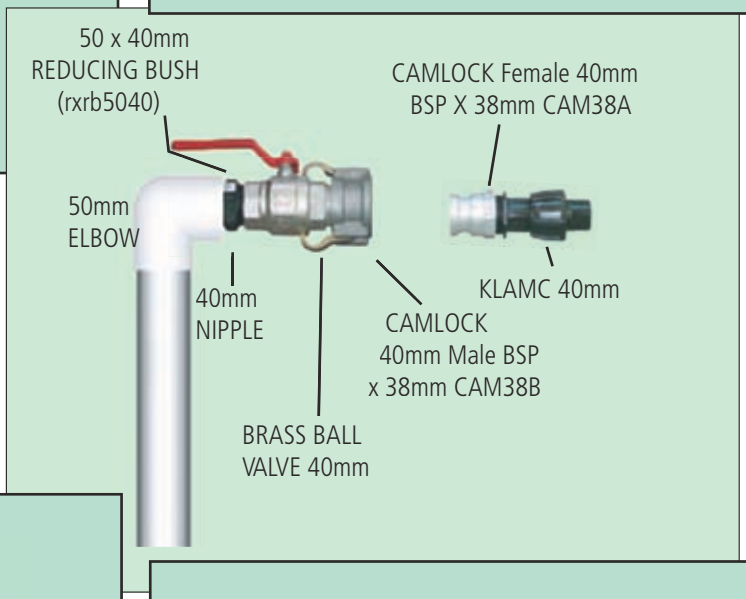
Application

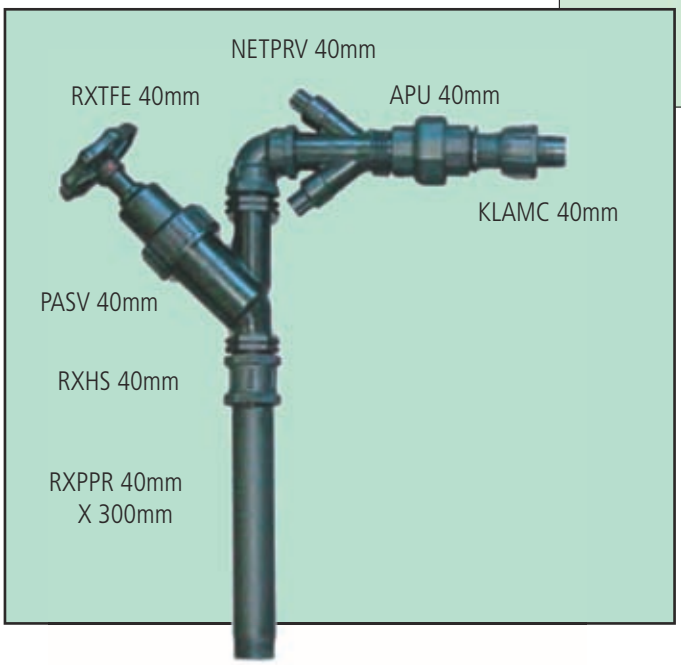
Naan Red Nozzle	=	65mm/24 hours
(2.5 Bar minimum pressure)	=	8 shifts = 65mm/24hours*12 hour operation
	=	32.5mm/application (28.5mm/week Avg)
Naan Blue Nozzle	=	84mm/24 hours
(2.5 Bar minimum pressure)	=	8 shifts = 84mm/24hours*12 hour operation
	=	42mm/application (36.75mm/week Avg)
Naan Black Nozzle	=	114.3mm/24 hours
(3 Bar minimum pressure)	=	8 shifts = 114.3mm/24hours*8 hour operation
	=	38.1mm/application (33.3mm/week Avg)

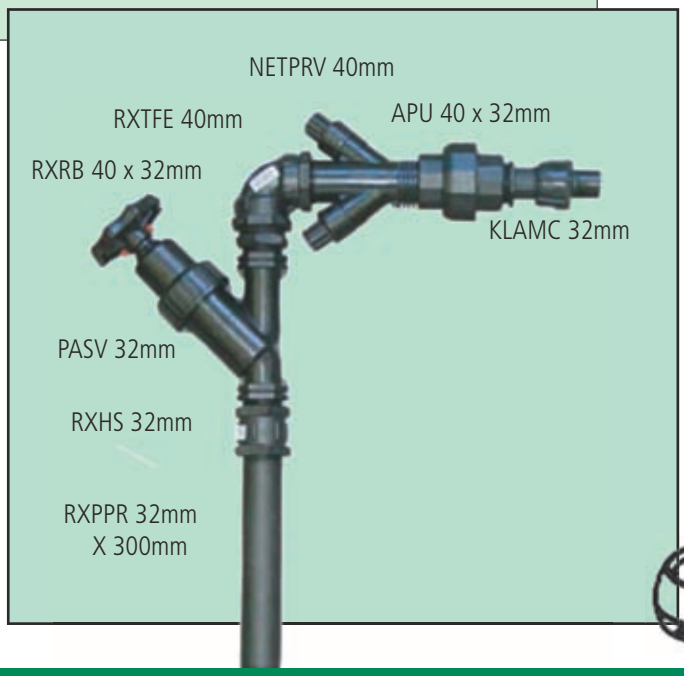
K Line - Fittings Options



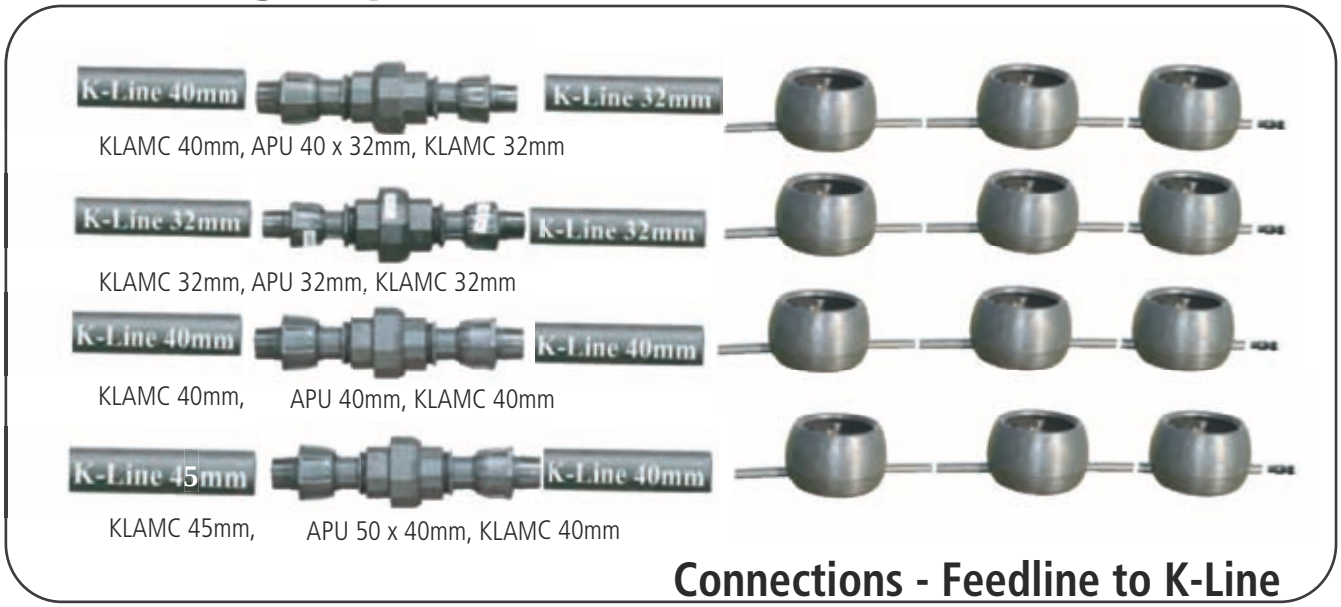








K Line - Fittings Options



Connections - Feedline to K-Line

Connections - Feedline & K-Line

End Connections

K-Line Internal Connections

K Line Naan 5022 Sprinkler

Full circle 1/2" plastic sprinkler

- One piece construction of body and bearing enlarging diameter coverage
- Color coded nozzles, bayonet construction for easy and quick cleaning or replacement.
- Single nozzle for K-Line.
- Integrated stream straightener improves wind resistance.
- New sand protection completely dependable and reliable for all sand conditions.
- Adjustable tension spring enables simple adjustment for nozzles and pressure changing.
- High impact heavy duty plastics materials provide resistance to corrosion and chemicals.
- Excellent uniformity of water distribution with high average of 90% C.U.

Maximum spacing :	up to 15m
Recommended working pressure :	1.7 - 4 bar
Flow rate :	450 - 1100 litres/hour

K Line Naan 5022 Sprinkler

mm Nozzle Color	Pressure bar	Flow m3/hr	Diameter (m)
2.8 Orange 2.2m Stream Ht 25° Sprinkler Angle	2	0.45	21.0
	3	0.55	22.5
	4	0.63	23.0
3.0 Red 2.2m Stream Ht 25° Sprinkler Angle	2	0.51	22.5
	3	0.63	23.0
	4	0.72	24.0
3.2 Green 2.2m Stream Ht 25° Sprinkler Angle	2	0.57	22.0
	3	0.70	23.0
	4	0.81	24.5
3.5 Blue 2.2m Stream Ht 25° Sprinkler Angle	2	0.66	23.0
	3	0.81	24.0
	4	0.93	25.0
4.0 Black 2.2m Stream Ht 25° Sprinkler Angle	2	0.85	23.5
	3	1.03	25.0
	4	1.18	25.5

Features:

- Heavy duty plastic construction
- Stainless steel springs and hammer shaft
- "Quick-Release" color coded bayonet nozzles for easy maintenance and replacement
- Newly developed, totally dependable sand and dust protection sleeve
- Stream straightener for extra coverage and wind resistance
- Excellent distribution uniformity at low pressure rates
- Wide selection of single nozzles 1.5 and 4 bar
- Discharge Rate : 0.45 - 1.18 m3/hr

ROTATOR™

R2000WF

The R2000WF is part of the Nelson Rotator family of sprinklers

217 - 1001 LPH

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NELSON IRRIGATION CORPORATION

The Nelson R2000 Wind-Fighter Rotator™

So why did Nelson invent the R2000WF?

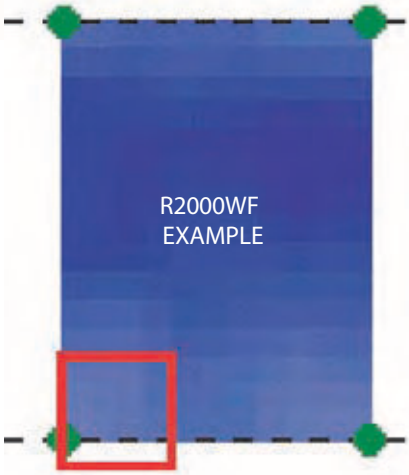
Because things are not as they seem Nelson's Rotator™ technology enables the development of higher performance. Over the past few decades designers of sprinkler irrigation systems have come to rely on overlap uniformity analysis when making decisions about sprinkler choice, spacing, and pressure. This technology nearly always utilises indoor testing in no wind conditions. Software packages like Space for windows, Nelson Overlap and others calculate CU, DU, SC as well as create graphics like densograms that show variations in water application. Overlap analysis has helped to improve the efficiency of irrigation system designs world wide, however they do not take into consideration the negative affect that wind has on distribution uniformity. The design of the new R2000WF has been shaped by outdoor test results. In fact, by introducing as little as a 4 mph wind condition to the R2000 WF the CU, and DU often improve (see figure). What's even more dramatic is that Nelson's outdoor testing so far has shown the R2000WF to have higher CU's and DU's than traditional impact sprinklers.

Things are not always as they seem especially when spacings get wider as well. Nelson have observed that as spacing gets wider high CU and DU figures from indoor testing are less likely to replicate in the field. Using advanced technologies, Nelson engineers have engineered distribution characteristics into the R2000WF specifically for wider spacings

R2000WF VS 1/2" IMPACT

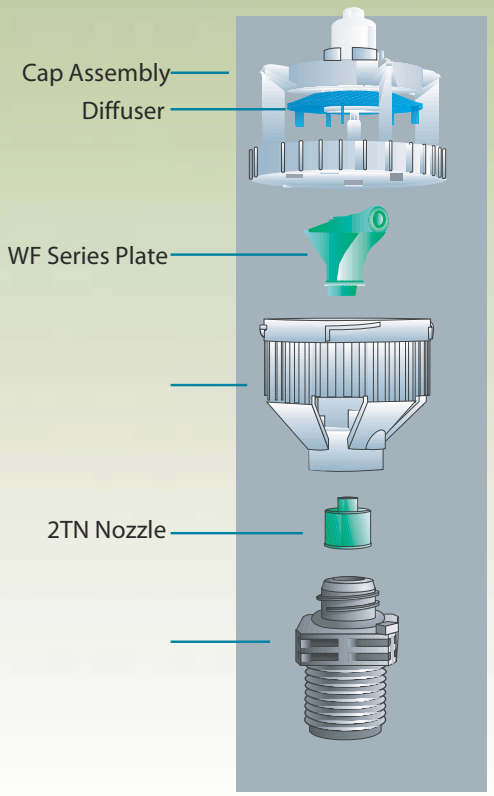
7/64 NOZZLE , 30 X 40, 50 PSI, 2.4 GPM, .18 IN/HR

5.8 MPH WIND
CU = 81% DU = 68%



5.6 MPH WIND
CU =90% DU = 85%

No other agricultural sprinkler matches the uniformity & dependability of the R2000 Windfighter



The drive arm of an impact sprinkler directs a "splash down" that seals the soil directly around the sprinkler, while barren "wind-skip" areas develop where the distorted stream doesn't reach the crop.

The R2000WF Rotator™ consistently delivers higher uniformity than impact sprinklers. It forms a tight wind-penetrating stream that is systematically broken up by a diffuser filling in the water pattern. Its sweeping action gently distributes water droplets to the ground preventing soil compaction.

R2000WF

Plate/Nozzle Options and Flow Performance

Plate Options*	Recommended Nozzles	BAR 2.0	2.5	3.0	3.5	4.0
Green WF14 Radius: 39 - 41 Ft 11.9 - 12.5 M	#13 Yellow (13/128)	366	411	451	487	521
	#14 Green (7/64)	413	463	509	550	590
Red WF16 Radius: 40 - 42 Ft 12.2 - 12.8 M	#15 Tan (15/128)	485	544	597	647	695
	#16 Red (1/8)	559	624	685	739	792
Gold WF18 Radius: 41-43 Ft 12.5 - 13.1 M	#18 Gold (9/64)	716	795	869	940	1001
Dark Brown WF20 Call for Availability Flow Data P reliminary	#20 Dark Brown	873	966	1062	1144	1222

*All plate options are high angle. The performance data in this section has been recorded under ideal test conditions and may be adversely affected by poor hydraulic entrance conditions slope, riser tilt, temperature, wind or other factors. Always be sure to use the nozzle size that is recommended for the plate. Always operate within the recommended pressure range. Only the nozzle and plate combinations grouped together in the above charts are recommended.

R2000WF (Windfighter) recommendations:
The best uniformity and performance will be achieved in the 45psi-60psi pressure range.

Nelson mini-regulators for pressure compensation:
In systems where the operating pressures vary considerably such as on hilly terrain, the Nelson mini-regulator can be used to provide excellent uniformity. This very effective regulator is available in three (3) pressure options. Choose either a 40psi, 45psi, or 50psi mini-regulator.

CAUTION! An important word of caution when using the Nelson mini-regulators.
The line pressure at the K-Line sprinklers must be at least 5psi greater than the pressure rating of the Nelson mini-regulator for correct performance. Example: when using a 45psi Nelson mini-regulator, the minimum pressure in the entire length of K-Line tubing should be greater than 50psi.

Elevating the status of sprinkler irrigation

The Nelson Rotator™ used throughout the world in pivot and orchard irrigation is raising the standards for sprinkler irrigation of pasture land. Irrigation systems should be judged by their ability to deliver uniform water distribution. While sprinkler systems have traditionally been simple and cost competitive, they sometimes fall short because of poor distribution uniformity due to stretched spacing or wind conditions. Utilizing the patented Rotator drive principle and diffuser, the R2000 WF (Wind-Fighter) is Nelson's sprinkler technology development that will improve many distribution uniformity problems.

K-Line Irrigation - Sprinkler Components & Options

NAAN 5022 IMPACT SPRINKLER

Order Code: Naan-5022-x

Nozzle Options Code (x)
O = Orange 2.8mm
R = Red 3.0mm
G = Green 3.2mm
B = Blue 3.5mm
BL = Black 4.0mm

K-LINE NAAN ADAPTOR: Connects NAAN 5022 Sprinkler to the K-Line Saddle.

Order Code: NAAN-ADAPT 1/2"bsp(Bottom) x 1/2"bsp (Top)

K-LINE TAPPING SADDLE: Includes Nuts & Washers. 32mm or 40mm

Order Code:
KLTPS32 - 32mm Tapping Saddle
KLTPS40 - 40mm Tapping Saddle
KLTPS45 - 45mm Tapping Saddle

NELSON R2000WF WINDFIGHTER

Order Code: R2000WF-x Nozzle Options Code (x)
1 = G-G Green Nozzle & Green Plate
2 = T-R Tan Nozzle & Red Plate
3 = R-R Red Nozzle & Red Plate
4 = GO-GO Gold Nozzle & Gold Plate
5 = BN-BN Brown Nozzle & Brown Plate

K-LINE NELSON ADAPTOR: Connects Nelson Windfighter Sprinkler to the K-Line Saddle.

Order Code: NEL-ADAPT 1/2"bsp(Bottom) x male acme (Top)

K-LINE TAPPING SADDLE: Includes Nuts & Washers. 32mm or 40mm

Order Code:
KLTPS32 - 32mm Tapping Saddle
KLTPS40 - 40mm Tapping Saddle
KLTPS45 - 45mm Tapping Saddle

NELSON R2000WF WINDFIGHTER - PRESSURE REGULATED

Order Code: R2000WF-x Nozzle Options Code (x)
1 = G-G Green Nozzle & Green Plate
2 = T-R Tan Nozzle & Red Plate
3 = R-R Red Nozzle & Red Plate
4 = GO-GO Gold Nozzle & Gold Plate
5 = BN-BN Brown Nozzle & Brown Plate

NELSON MINI-REGULATOR: Regulator Options Code (x)

Order Code: NEL-REG-x 1= 40psi 2= 45psi 3= 50psi
1/2"fnpt(Bottom) x male acme (Top)

K-LINE NELSON NIPPLE Connects Nelson Mini-Regulator to the K-Line Saddle.

Order Code: NEL-NIPPLE 1/2"mnpt(Bottom) x 1/2"mnpt(Top)

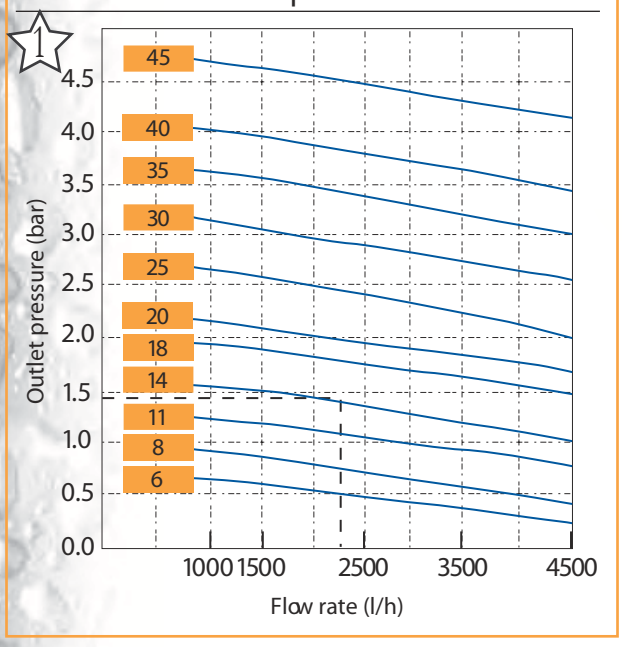
K-LINE TAPPING SADDLE: Includes Nuts & Washers. 32mm or 40mm

Order Code:
KLTPS32 - 32mm Tapping Saddle
KLTPS40 - 40mm Tapping Saddle
KLTPS45 - 45mm Tapping Saddle

Pressure Regulator

- Suitable for K-Line
- Sealed regulating units, field replaceable (2000 Series)
- Built in indicator pops out when proper pressure is achieved

2000 Series outlet pressure vs. flow rate

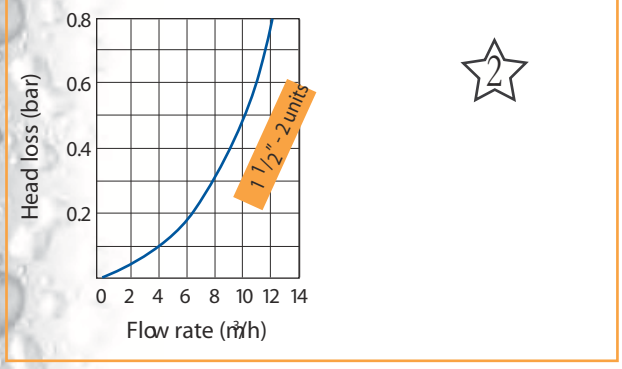


Example flow rate - output pressure

Given flow rate = 4.6 m³/h
Required output pressure = 1.4 bar
Calculation: Selected product = PRV 11/2 " x 2 springs.
Headloss across the PRV unit at 4.6 m³/h = 0.12 bar (graph 2).
Flow rate per spring = 4.6/2 = 2.3 m³/h.
Selected spring 1.4 = output pressure at 2.3 m³/h is 1.4 bar (graph 1).

Total minimum required inlet pressure = 1.4 + 0.12 + 0.2 (0.2bar is constant addition to move the piston out) = 1.72 bar.
Spring pressure regulator valve = > head loss + actual output pressure + 0.2 bar = minimum required inlet pressure.

Pressure regulators (head loss vs. flow rate)



40mm (1 1/2")

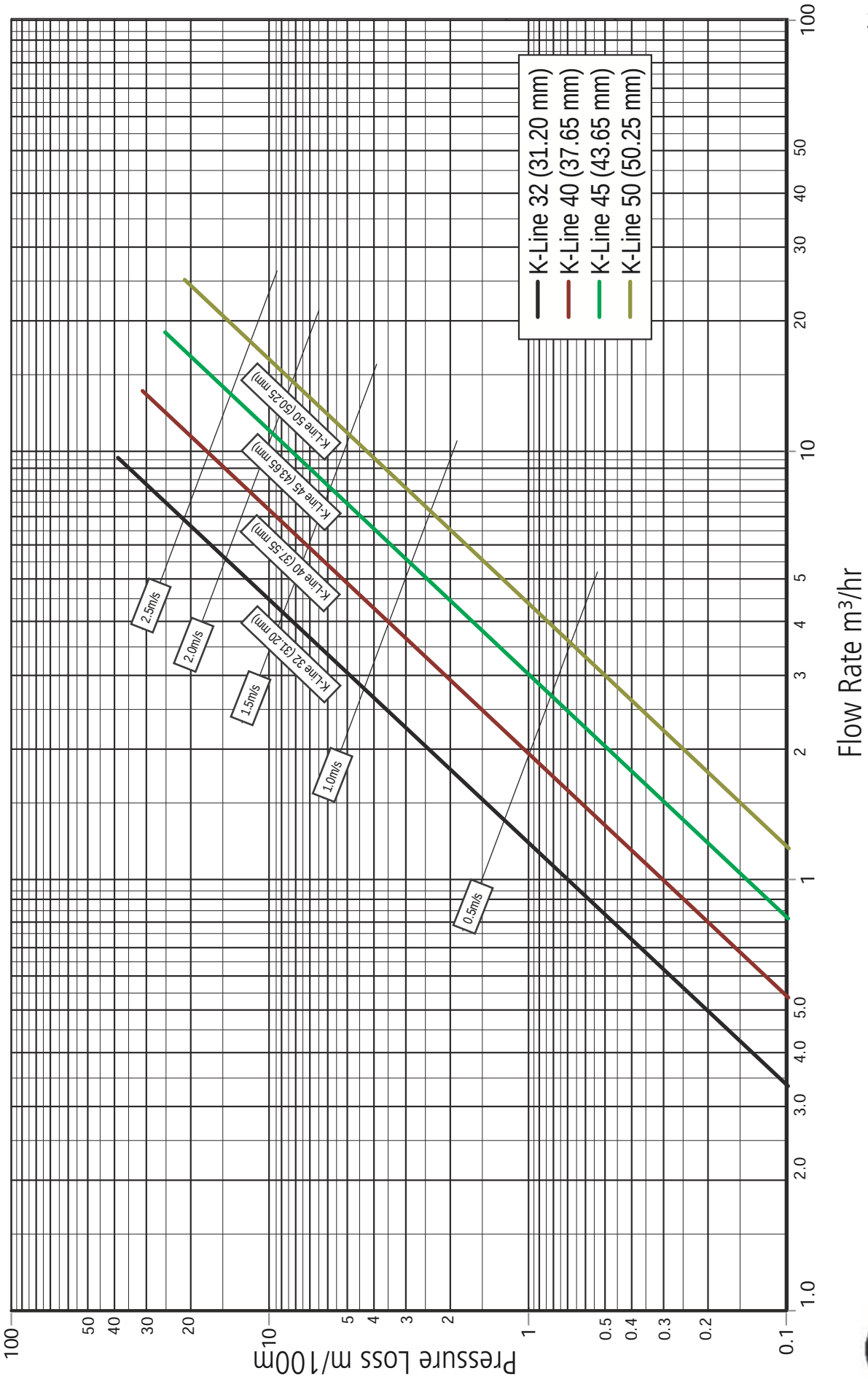
Available regulating units for 2000 series (outlet pressure bar)

3.0 | 3.5 | 4.0 | 4.5

Pressure regulators selection

Product	model	min. flowrate m³/hr	max. flow rate m³/hr	max. inlet pressure bar	body material
11/2" (2 Springs)	2000	1.6	9.0	10	plastic

K-Line Flow Chart



Indicative Weights for K Lines as specified in the Charts

at 15metre spacings

Skids	Orange 32	Orange 40	Orange 50	Orange weight
6	5.0			102 Kg
7	6.0			122 Kg
8	7.0			142 Kg
9	8.0			161 Kg
10	9.0			181 Kg
11	8.5	1.5		210 Kg
12	7.5	3.5		243 Kg
13	6.5	5.5		275 Kg
14	8.5	4.5		288 Kg

Skids	Red 32	Red 40	Red 50	Red weight
6	5.0			102 Kg
7	6.0			122 Kg
8	7.0			142 Kg
9	8.0			161 Kg
10	9.0			181 Kg
11	7.5	2.5		217 Kg
12	6.5	4.5		249 Kg
13	4.5	7.5		287 Kg
14		13.0		341 Kg

Skids	Green 32	Green 40	Green 50	Green weight
6	5.0			102 Kg
7	6.0			122 Kg
8	7.0			142 Kg
9	8.0			161 Kg
10	7.5	1.5		191 Kg
11	6.5	3.5		223 Kg
12	4.5	6.5		261 Kg
13		12.0		315 Kg
14		13.0		341 Kg

Skids	Blue 32	Blue 40	Blue 50	Blue weight
6	5.0			102 Kg
7	6.0			122 Kg
8	7.0			142 Kg
9	6.5	1.5		171 Kg
10	5.5	3.5		203 Kg
11	3.5	6.5		241 Kg
12		11.0		289 Kg
13		12.0		315 Kg
14		13.0		341 Kg

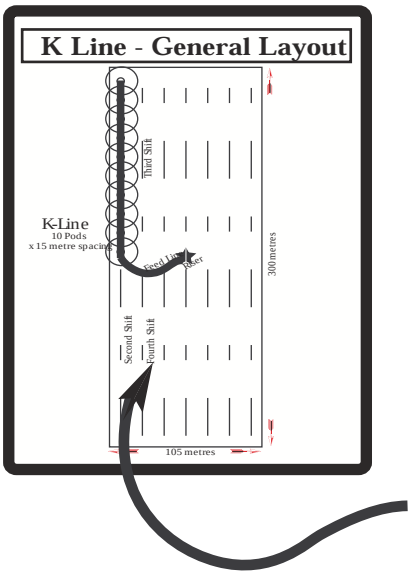
Skids	Black 32	Black 40	Black 50	Black weight
6	5.0			102 Kg
7	6.0			122 Kg
8	5.5	1.5		151 Kg
9	3.5	4.5		189 Kg
10		9.0		237 Kg
11		10.0		263 Kg
12		11.0		289 Kg
13		12.0		315 Kg
14		13.0		341 Kg

Nominal Size	Internal Dia mm	OD Dia mm
32	31.2mm	37.75mm
40	37.55mm	44.15mm
45	43.65mm	50.25mm

NB: For best traction the lighter the line the easier it will be to move, especially on damp or wet grass. Experience would suggest 10-12 skids a maximum without the necessary step to a four wheel drive four wheeler to move it.

Irrigation Systems

K-Line Design Tips



15 metre strips

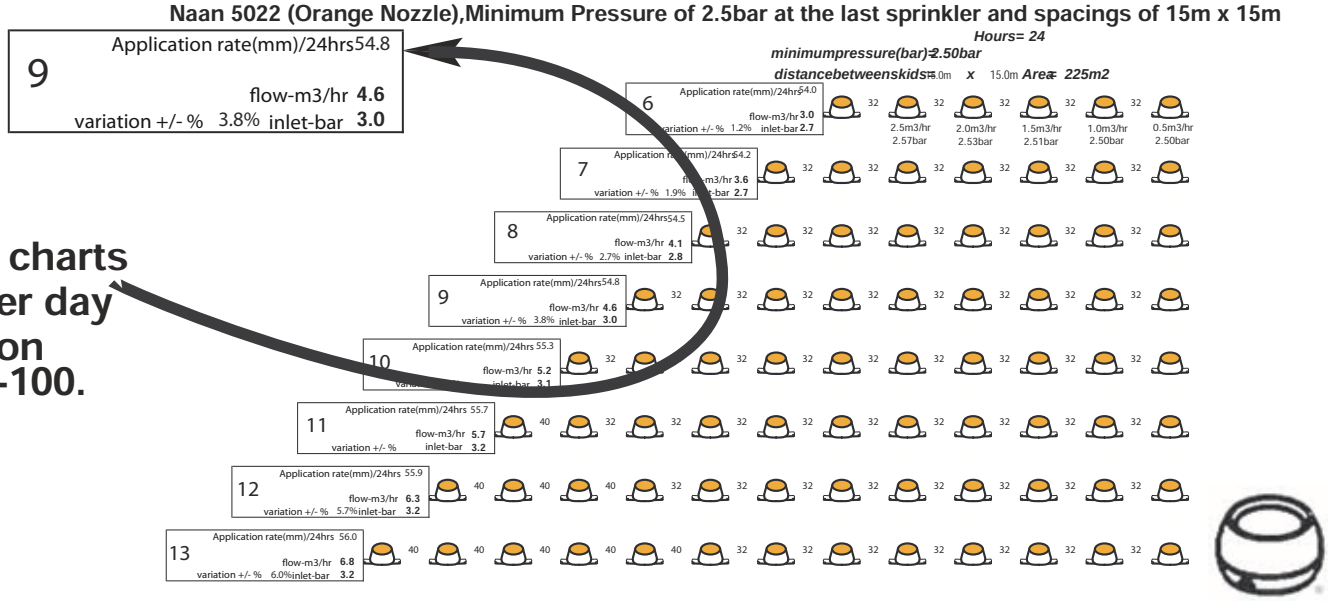
1. Review the total field and property layout - if there are no fences create rectangle shaped fields of optimum sizes. (up to 360m in length.) e.g. 14 day return (at left).
2. Measure the length and width of each field and record the dimensions.
3. Sketch the general pod layout.(field by field - no greater than 14 day return - no less than a 6 or 7 day return).
4. Determine the approximate 15 metre strips that will fit and the direction of those strips. (variation of 14-16.5m).

CAUTION! If the width of the strip is greater than 15 metres, then the distance between sprinklers should be reduced so as not to exceed 225 square metres per sprinkler. Also normally avoid an *odd* number of shifts unless you have at least two lines in the field.

5 Select the smallest theoretical field (after general design) as a starting point.

6. Select the nozzle from this technical data book that best fits the clients application requirement in mm per day.

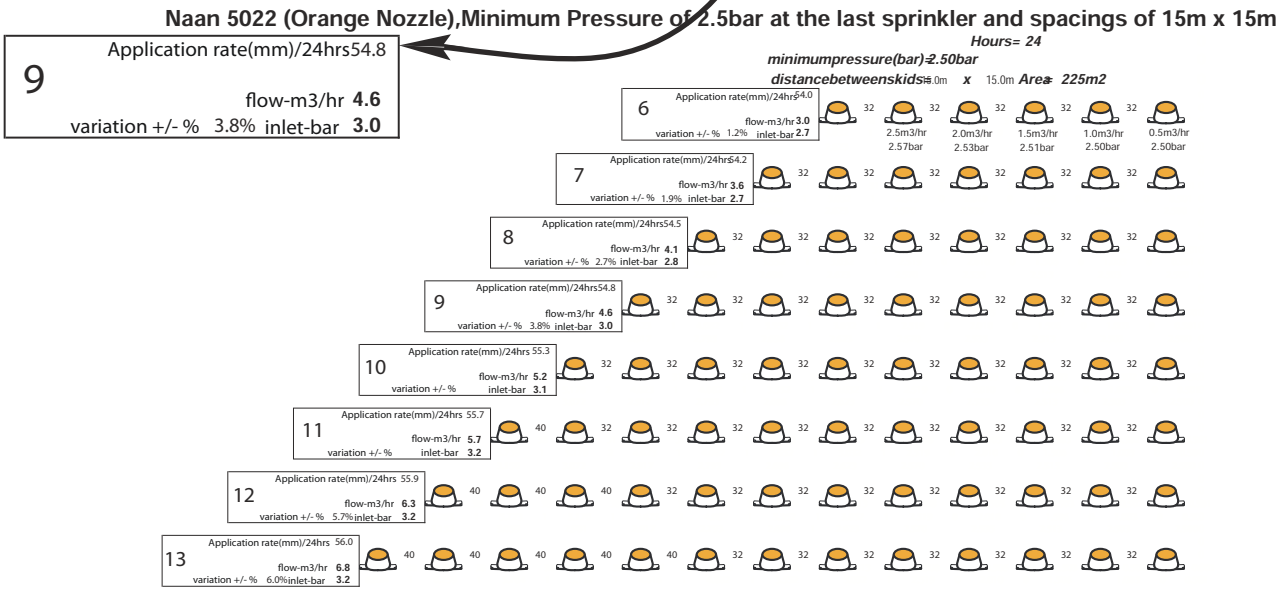
Naan 5022 (Orange Nozzle),Minimum Pressure of 2.5bar at the last sprinkler and spacings of 15m x 15m



Refer to the Sprinkler charts for mm per day information pages 27-100.

K-Line Design Tips

6. Select the smallest theoretical field (after general design) as a starting point continued . . . e.g. If you have 10,12 & 14 day returns, 9 pod lines and the client has asked for 30mm/week average ... you would select the 10 day period first. Then find the sprinkler that closest fits the application requirement. i.e. the per day application would be 10/7days x the required client application ... therefore 10/7(=1.43) x 30mm ➤ sprinkler required would give 42.9mm/application of 24 hours ... then refer to the Technical Data Book ... The smallest nozzle that we can select is an Orange@ minimum 2.5bar. This gives an application of 54.8mm per application not 42.9mm therefore we will need to run the pumping system for = 42.9mm/54.8mm = 78% of 24hours ... therefore we would run for 18.7 hours.



7. The next process that must be completed is the balancing of application rates (per week) into each field. To do this we would multiply 54.8mm by the difference from the field that we selected.

K-Line Design Tips

7. Balancing application rates continued . . .
   e.g 12 day return must apply 12/10 x the amount of application from above ... (54.8mm/application) ...

   = 1.2 x 54.8mm = 65.8mm/ appln required for any 12 day return and a 14 day return would be
   = 14/10 x 54.8mm = 76.7mm/ appln...

   We would then refer to the Technical Data Book for a nozzle selection that will get close to the theoretical applications calculated. The object of this is to balance all of the fields so they recieve the exact same quantity of water per week.

8. Determine the location of the risers.

9. Draw the above ground layout with position of risers, feedlines and pod/ sprinkler lines.

10. Record the water requirements for each pod / sprinkler line and number each line on the drawing (layout).

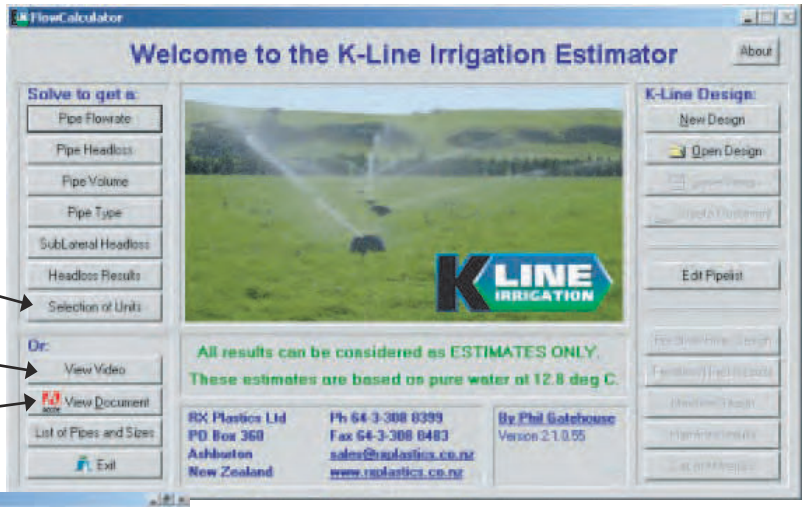
11. Water requirements for the total property should now be available.12. With each numbered line calculation of the feedlines hydraulically should be done ... you have the flow rate and the pressure required for each line, the length of the feedline. Selec tion of the feedline size should now be done. This will provide the pressure and flow for each riser. please note:- flow calculation can be achieved with the "K-Line Flow Calculator Program" (refer to next page).

13. The below ground hydraulics can now be done.

Good Luck!

K-Line Design Tips

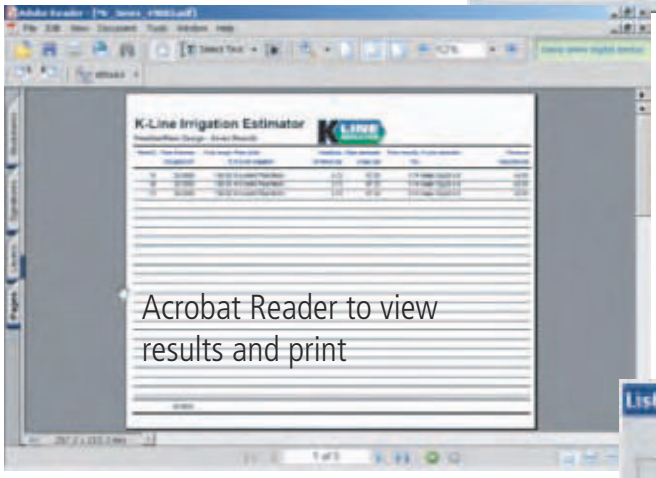
K-Line Calculator Program ~ intended to help with K-Line design. Helps with selection of pipe, sprinklers and pod numbers. An invaluable tool for designing K-Line irrigation systems. This tool is registered with RX Plastics Ltd for use for six months then a new registration is needed.



Select ft/m psi/bar etc....

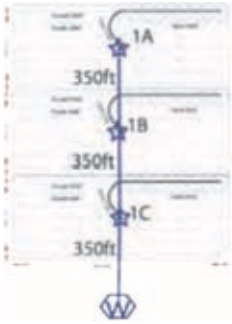
View incorporated K-Line video and other videos.

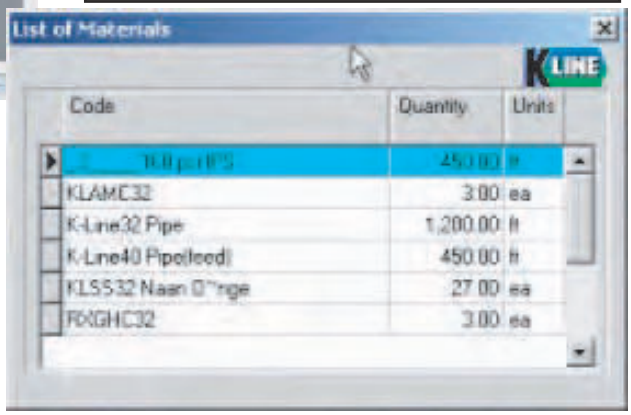
View K-Line Technical Book and flow charts



Acrobat Reader to view results and print

Example layout





Example layout

List of Materials for K-Line design.

Naan 5022 (Orange Nozzle),Minimum Pressure of 2.5 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 36.3 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.50 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

| | | |

Naan 5022 (Orange Nozzle),Minimum Pressure of 2.7 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 39.2 psi

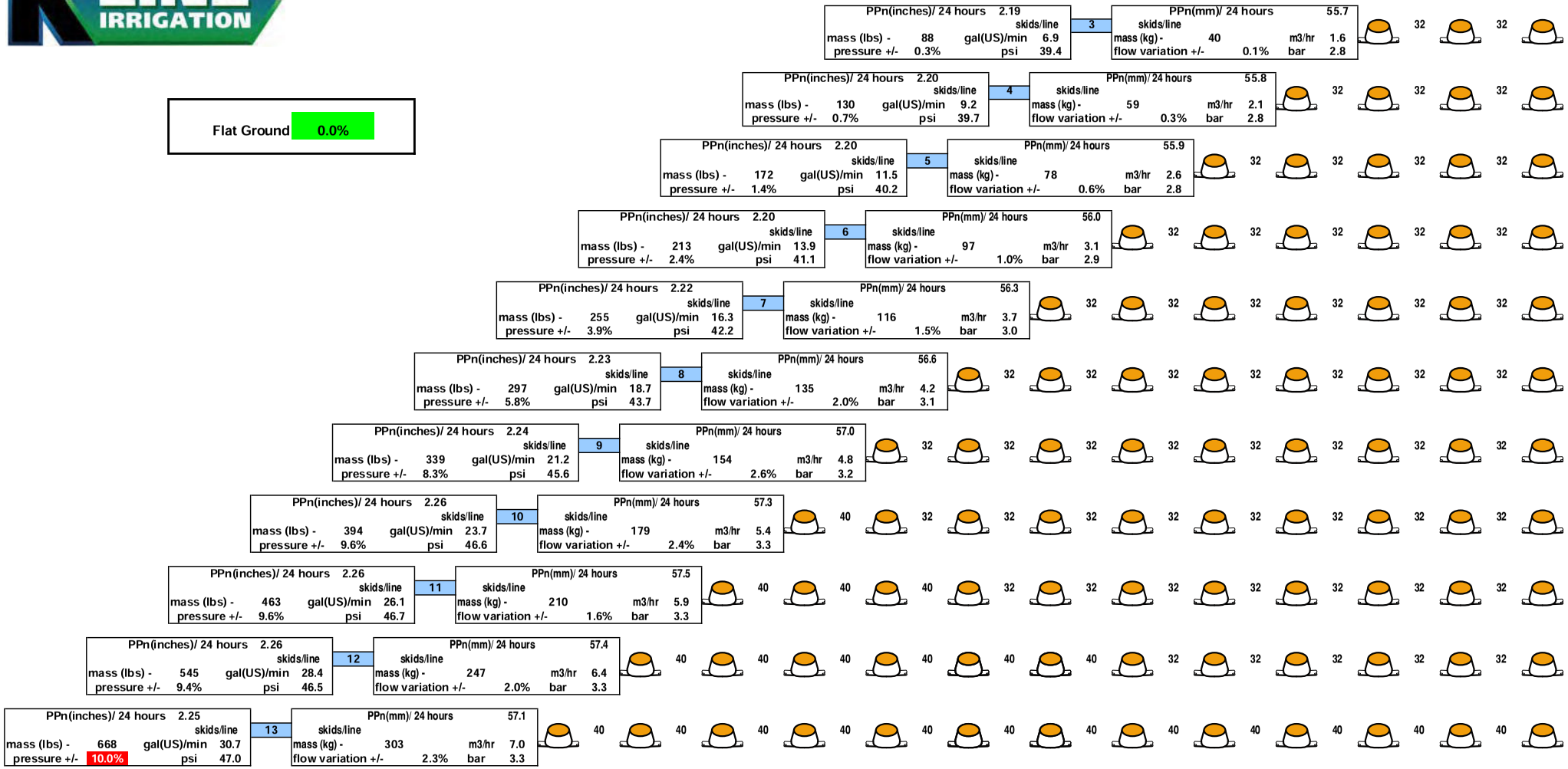
Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.70 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line			
3	2.19		55.7		mass (lbs) -	88	gal(US)/min 6.9
					pressure +/-	0.3%	psi 39.4
					mass (kg) -	40	m3/hr 1.6
					flow variation +/-	0.1%	bar 2.8
4	2.20		55.8		mass (lbs) -	130	gal(US)/min 9.2
					pressure +/-	0.7%	psi 39.7
					mass (kg) -	59	m3/hr 2.1
					flow variation +/-	0.3%	bar 2.8
5	2.20		55.9		mass (lbs) -	172	gal(US)/min 11.5
					pressure +/-	1.4%	psi 40.2
					mass (kg) -	78	m3/hr 2.6
					flow variation +/-	0.6%	bar 2.8
6	2.20		56.0		mass (lbs) -	213	gal(US)/min 13.9
					pressure +/-	2.4%	psi 41.1
					mass (kg) -	97	m3/hr 3.1
					flow variation +/-	1.0%	bar 2.9
7	2.22		56.3		mass (lbs) -	255	gal(US)/min 16.3
					pressure +/-	3.9%	psi 42.2
					mass (kg) -	116	m3/hr 3.7
					flow variation +/-	1.5%	bar 3.0
8	2.23		56.6		mass (lbs) -	297	gal(US)/min 18.7
					pressure +/-	5.8%	psi 43.7
					mass (kg) -	135	m3/hr 4.2
					flow variation +/-	2.0%	bar 3.1
9	2.24		57.0		mass (lbs) -	339	gal(US)/min 21.2
					pressure +/-	8.3%	psi 45.6
					mass (kg) -	154	m3/hr 4.8
					flow variation +/-	2.6%	bar 3.2
10	2.26		57.3		mass (lbs) -	394	gal(US)/min 23.7
					pressure +/-	9.6%	psi 46.6
					mass (kg) -	179	m3/hr 5.4
					flow variation +/-	2.4%	bar 3.3
11	2.26		57.5		mass (lbs) -	463	gal(US)/min 26.1
					pressure +/-	9.6%	psi 46.7
					mass (kg) -	210	m3/hr 5.9
					flow variation +/-	1.6%	bar 3.3
12	2.26		57.4		mass (lbs) -	545	gal(US)/min 28.4
					pressure +/-	9.4%	psi 46.5
					mass (kg) -	247	m3/hr 6.4
					flow variation +/-	2.0%	bar 3.3
13	2.25		57.1		mass (lbs) -	668	gal(US)/min 30.7
					pressure +/-	10.0%	psi 47.0
					mass (kg) -	303	m3/hr 7.0
					flow variation +/-	2.3%	bar 3.3



Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line			
6	2.99		75.9		mass (lbs) -	186	gal(US)/min 18.8
					pressure +/-	3.5%	psi 49.7
					mass (kg) -	84	m3/hr 4.3
					flow variation +/-	1.7%	bar 3.5

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Orange Nozzle),Minimum Pressure of 3 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 43.5 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.00 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

Line	PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar	Pods
3	2.31		88	7.3	0.3%	43.7	58.6		40	1.6	0.1%	3.1	32, 32
4	2.31		130	9.7	0.7%	44.1	58.7		59	2.2	0.3%	3.1	32, 32, 32
5	2.31		172	12.1	1.4%	44.7	58.8		78	2.8	0.6%	3.1	32, 32, 32, 32
6	2.32		213	14.6	2.4%	45.6	59.0		97	3.3	1.0%	3.2	32, 32, 32, 32, 32
7	2.33		255	17.1	3.8%	46.8	59.2		116	3.9	1.5%	3.3	32, 32, 32, 32, 32, 32
8	2.34		297	19.7	5.7%	48.5	59.5		135	4.5	2.0%	3.4	32, 32, 32, 32, 32, 32, 32
9	2.36		339	22.3	8.2%	50.6	59.9		154	5.1	2.5%	3.5	32, 32, 32, 32, 32, 32, 32, 32
10	2.37		394	24.9	9.4%	51.7	60.3		179	5.6	2.4%	3.6	40, 32, 32, 32, 32, 32, 32, 32, 32
11	2.38		463	27.5	9.5%	51.8	60.5		210	6.2	1.6%	3.6	40, 40, 40, 32, 32, 32, 32, 32, 32, 32
12	2.37		545	29.9	9.3%	51.6	60.3		247	6.8	1.9%	3.6	40, 40, 40, 40, 40, 40, 32, 32, 32, 32, 32
13	2.37		668	32.3	9.9%	52.1	60.1		303	7.3	2.3%	3.6	40, 40, 40, 40, 40, 40, 40, 40, 40, 40, 40, 40

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar
2.99		186	18.8	3.5%	49.7	75.9		84	4.3	1.7%	3.5

Pods: 6

< 15m > 40mm | < 15m > 40mm | < 15m > 40mm | <End of Line>

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Orange Nozzle),Minimum Pressure of 3.2 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 46.4 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.20 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	PPn(mm)/ 24 hours	skids/line	Pods
3	2.38	60.5	3	32 32
4	2.38	60.5	4	32 32 32
5	2.39	60.7	5	32 32 32 32
6	2.40	60.9	6	32 32 32 32 32
7	2.41	61.1	7	32 32 32 32 32 32
8	2.42	61.4	8	32 32 32 32 32 32 32
9	2.43	61.8	9	32 32 32 32 32 32 32 32
10	2.45	62.2	10	40 32 32 32 32 32 32 32 32
11	2.46	62.4	11	40 40 40 32 32 32 32 32 32 32
12	2.45	62.2	12	40 40 40 40 40 40 32 32 32 32 32
13	2.44	62.0	13	40 40 40 40 40 40 40 40 40 40 40 40

	mass (lbs)	gal(US)/min	skids/line	pressure +/-	psi	mass (kg)	m3/hr	skids/line	flow variation +/-	bar
3	88	7.5	3	0.3%	46.7	40	1.7	3	0.1%	3.3
4	130	10.0	4	0.7%	47.0	59	2.3	4	0.3%	3.3
5	172	12.5	5	1.4%	47.7	78	2.8	5	0.6%	3.3
6	213	15.1	6	2.4%	48.6	97	3.4	6	1.0%	3.4
7	255	17.7	7	3.8%	49.9	116	4.0	7	1.5%	3.5
8	297	20.3	8	5.7%	51.7	135	4.6	8	2.0%	3.6
9	339	23.0	9	8.1%	53.9	154	5.2	9	2.5%	3.8
10	394	25.7	10	9.3%	55.1	179	5.8	10	2.4%	3.8
11	463	28.3	11	9.4%	55.1	210	6.4	11	1.6%	3.9
12	545	30.8	12	9.2%	55.0	247	7.0	12	1.9%	3.8
13	668	33.3	13	9.8%	55.5	303	7.6	13	2.2%	3.9

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	2.99	PPn(mm)/ 24 hours	75.9
skids/line	6	skids/line	6
mass (lbs) -	186	mass (kg) -	84
gal(US)/min	18.8	m3/hr	4.3
pressure +/-	3.5%	flow variation +/-	1.7%
psi	49.7	bar	3.5

< 15m > 40mm < 15m > 40mm < 15m > 40mm <End of Line>

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Red Nozzle),Minimum Pressure of 2.5 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 36.3 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.50 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	Spacing
3	mass (lbs) - 88, gal(US)/min 7.6, pressure +/- 0.4%, psi 36.5		mass (kg) - 40, m3/hr 1.7, flow variation +/- 0.2%, bar 2.6		32, 32
4	mass (lbs) - 130, gal(US)/min 10.1, pressure +/- 0.9%, psi 36.9		mass (kg) - 59, m3/hr 2.3, flow variation +/- 0.4%, bar 2.6		32, 32, 32
5	mass (lbs) - 172, gal(US)/min 12.7, pressure +/- 1.8%, psi 37.5		mass (kg) - 78, m3/hr 2.9, flow variation +/- 0.8%, bar 2.6		32, 32, 32, 32
6	mass (lbs) - 213, gal(US)/min 15.3, pressure +/- 3.1%, psi 38.5		mass (kg) - 97, m3/hr 3.5, flow variation +/- 1.3%, bar 2.7		32, 32, 32, 32, 32
7	mass (lbs) - 255, gal(US)/min 17.9, pressure +/- 5.0%, psi 39.9		mass (kg) - 116, m3/hr 4.1, flow variation +/- 1.9%, bar 2.8		32, 32, 32, 32, 32, 32
8	mass (lbs) - 297, gal(US)/min 20.6, pressure +/- 7.4%, psi 41.7		mass (kg) - 135, m3/hr 4.7, flow variation +/- 2.6%, bar 2.9		32, 32, 32, 32, 32, 32, 32
9	mass (lbs) - 352, gal(US)/min 23.4, pressure +/- 8.8%, psi 42.6		mass (kg) - 160, m3/hr 5.3, flow variation +/- 2.5%, bar 3.0		40, 32, 32, 32, 32, 32, 32, 32
10	mass (lbs) - 421, gal(US)/min 26.0, pressure +/- 8.9%, psi 42.7		mass (kg) - 191, m3/hr 5.9, flow variation +/- 1.7%, bar 3.0		40, 40, 40, 32, 32, 32, 32, 32, 32
11	mass (lbs) - 490, gal(US)/min 28.7, pressure +/- 9.8%, psi 43.3		mass (kg) - 222, m3/hr 6.5, flow variation +/- 2.1%, bar 3.0		40, 40, 40, 40, 40, 40, 32, 32, 32, 32, 32
12	mass (lbs) - 613, gal(US)/min 31.1, pressure +/- 10.1%, psi 43.6		mass (kg) - 278, m3/hr 7.1, flow variation +/- 2.5%, bar 3.1		40, 40, 40, 40, 40, 40, 40, 40, 40, 40, 40, 40
13	mass (lbs) - 713, gal(US)/min 33.8, pressure +/- 9.3%, psi 43.0		mass (kg) - 323, m3/hr 7.7, flow variation +/- 1.5%, bar 3.0		45, 45, 45, 40, 40, 40, 40, 40, 40, 40, 40, 40, 40

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line
6	mass (lbs) - 186, gal(US)/min 18.8, pressure +/- 3.5%, psi 49.7		mass (kg) - 84, m3/hr 4.3, flow variation +/- 1.7%, bar 3.5	

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Red Nozzle),Minimum Pressure of 2.7 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 39.2 psi

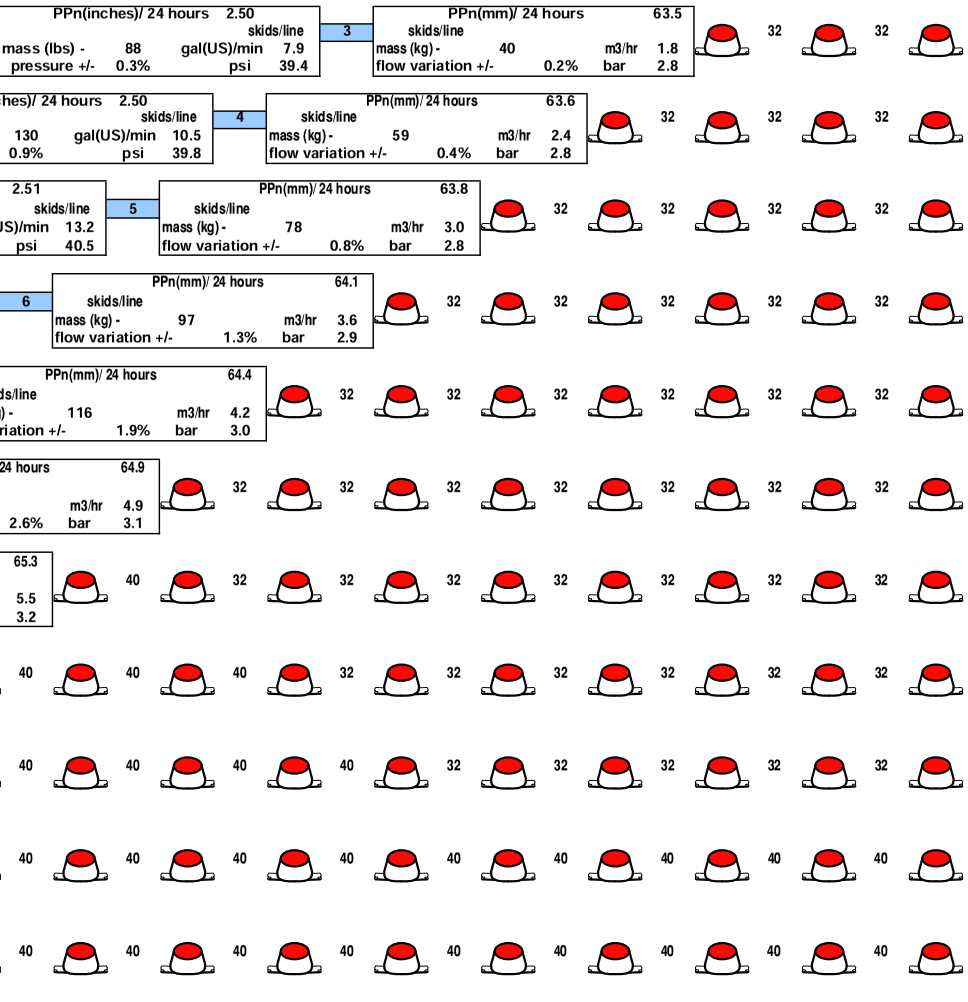
Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.70 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line
3	mass (lbs) - 88; gal(US)/min 7.9; pressure +/- 0.3%; psi 39.4		mass (kg) - 40; m3/hr 1.8; flow variation +/- 0.2%; bar 2.8	
4	mass (lbs) - 130; gal(US)/min 10.5; pressure +/- 0.9%; psi 39.8		mass (kg) - 59; m3/hr 2.4; flow variation +/- 0.4%; bar 2.8	
5	mass (lbs) - 172; gal(US)/min 13.2; pressure +/- 1.8%; psi 40.5		mass (kg) - 78; m3/hr 3.0; flow variation +/- 0.8%; bar 2.8	
6	mass (lbs) - 213; gal(US)/min 15.9; pressure +/- 3.1%; psi 41.6		mass (kg) - 97; m3/hr 3.6; flow variation +/- 1.3%; bar 2.9	
7	mass (lbs) - 255; gal(US)/min 18.6; pressure +/- 4.9%; psi 43.0		mass (kg) - 116; m3/hr 4.2; flow variation +/- 1.9%; bar 3.0	
8	mass (lbs) - 297; gal(US)/min 21.4; pressure +/- 7.4%; psi 44.9		mass (kg) - 135; m3/hr 4.9; flow variation +/- 2.6%; bar 3.1	
9	mass (lbs) - 352; gal(US)/min 24.3; pressure +/- 8.7%; psi 45.9		mass (kg) - 160; m3/hr 5.5; flow variation +/- 2.5%; bar 3.2	
10	mass (lbs) - 421; gal(US)/min 27.0; pressure +/- 8.8%; psi 46.1		mass (kg) - 191; m3/hr 6.1; flow variation +/- 1.7%; bar 3.2	
11	mass (lbs) - 490; gal(US)/min 29.8; pressure +/- 9.7%; psi 46.7		mass (kg) - 222; m3/hr 6.8; flow variation +/- 2.1%; bar 3.3	
12	mass (lbs) - 613; gal(US)/min 32.3; pressure +/- 10.1%; psi 47.0		mass (kg) - 278; m3/hr 7.3; flow variation +/- 2.5%; bar 3.3	
13	mass (lbs) - 713; gal(US)/min 35.1; pressure +/- 9.2%; psi 46.4		mass (kg) - 323; m3/hr 8.0; flow variation +/- 1.5%; bar 3.2	



Average application rate millimetres per 24 hours

Number of pods per line

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line
6	mass (lbs) - 186; gal(US)/min 18.8; pressure +/- 3.5%; psi 49.7		mass (kg) - 84; m3/hr 4.3; flow variation +/- 1.7%; bar 3.5	

Selection of Pipe for each 15 metre section

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required pressure at the start of the line

Required flow rate (total) for the line

Naan 5022 (Red Nozzle),Minimum Pressure of 3 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 43.5 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.00 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line
3	2.64	3	67.0	32 32
4	2.64	4	67.1	32 32 32
5	2.65	5	67.3	32 32 32 32
6	2.66	6	67.5	32 32 32 32 32
7	2.67	7	67.9	32 32 32 32 32 32
8	2.69	8	68.3	32 32 32 32 32 32 32
9	2.71	9	68.8	40 32 32 32 32 32 32 32
10	2.72	10	69.0	40 40 40 32 32 32 32 32 32
11	2.72	11	69.1	40 40 40 40 40 32 32 32 32 32
12	2.71	12	68.8	40 40 40 40 40 40 40 40 40 40 40
13	2.71	13	68.9	45 45 45 40 40 40 40 40 40 40 40 40 40

	mass (lbs) -	gal(US)/min	psi	mass (kg) -	m3/hr	bar	flow variation +/-
3	88	8.3	43.8	40	1.9	3.1	0.2%
4	130	11.1	44.3	59	2.5	3.1	0.4%
5	172	13.9	45.0	78	3.2	3.2	0.8%
6	213	16.7	46.2	97	3.8	3.2	1.3%
7	255	19.6	47.7	116	4.5	3.3	1.9%
8	297	22.6	49.8	135	5.1	3.5	2.5%
9	352	25.6	51.0	160	5.8	3.6	2.5%
10	421	28.5	51.1	191	6.5	3.6	1.7%
11	490	31.4	51.8	222	7.1	3.6	2.1%
12	613	34.1	52.1	278	7.7	3.6	2.5%
13	713	37.0	51.4	323	8.4	3.6	1.4%

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours
2.99	6	75.9

mass (lbs) -	gal(US)/min	psi	mass (kg) -	m3/hr	bar	flow variation +/-
186	18.8	49.7	84	4.3	3.5	1.7%

< 15m > 40mm < 15m > 40mm < 15m > 40mm <End of Line>

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Red Nozzle),Minimum Pressure of 3.2 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 46.4 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.20 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	Spacings
3	mass (lbs) - 88, gal(US)/min 8.6; pressure +/- 0.3%, psi 46.7		mass (kg) - 40, m3/hr 1.9; flow variation +/- 0.2%, bar 3.3		32 32
4	mass (lbs) - 130, gal(US)/min 11.4; pressure +/- 0.9%, psi 47.2		mass (kg) - 59, m3/hr 2.6; flow variation +/- 0.4%, bar 3.3		32 32 32
5	mass (lbs) - 172, gal(US)/min 14.3; pressure +/- 1.7%, psi 48.0		mass (kg) - 78, m3/hr 3.3; flow variation +/- 0.8%, bar 3.4		32 32 32 32
6	mass (lbs) - 213, gal(US)/min 17.3; pressure +/- 3.0%, psi 49.2		mass (kg) - 97, m3/hr 3.9; flow variation +/- 1.3%, bar 3.4		32 32 32 32 32
7	mass (lbs) - 255, gal(US)/min 20.3; pressure +/- 4.8%, psi 50.9		mass (kg) - 116, m3/hr 4.6; flow variation +/- 1.9%, bar 3.6		32 32 32 32 32 32
8	mass (lbs) - 297, gal(US)/min 23.3; pressure +/- 7.2%, psi 53.1		mass (kg) - 135, m3/hr 5.3; flow variation +/- 2.5%, bar 3.7		32 32 32 32 32 32 32
9	mass (lbs) - 352, gal(US)/min 26.4; pressure +/- 8.5%, psi 54.3		mass (kg) - 160, m3/hr 6.0; flow variation +/- 2.4%, bar 3.8		40 32 32 32 32 32 32 32
10	mass (lbs) - 421, gal(US)/min 29.4; pressure +/- 8.7%, psi 54.4		mass (kg) - 191, m3/hr 6.7; flow variation +/- 1.7%, bar 3.8		40 40 40 32 32 32 32 32 32
11	mass (lbs) - 490, gal(US)/min 32.4; pressure +/- 9.5%, psi 55.2		mass (kg) - 222, m3/hr 7.4; flow variation +/- 2.1%, bar 3.9		40 40 40 40 40 32 32 32 32 32
12	mass (lbs) - 613, gal(US)/min 35.2; pressure +/- 9.8%, psi 55.5		mass (kg) - 278, m3/hr 8.0; flow variation +/- 2.5%, bar 3.9		40 40 40 40 40 40 40 40 40 40 40
13	mass (lbs) - 713, gal(US)/min 38.2; pressure +/- 9.0%, psi 54.8		mass (kg) - 323, m3/hr 8.7; flow variation +/- 1.4%, bar 3.8		45 45 45 40 40 40 40 40 40 40 40 40 40

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line
2.99	6	75.9	
mass (lbs) - 186, gal(US)/min 18.8; pressure +/- 3.5%, psi 49.7		mass (kg) - 84, m3/hr 4.3; flow variation +/- 1.7%, bar 3.5	

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Green Nozzle),Minimum Pressure of 2.5 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 36.3 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.50 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	Pods
3	2.69	mass (lbs) - 88, gal(US)/min 8.5, pressure +/- 0.4%, psi 36.6	68.2	mass (kg) - 40, m3/hr 1.9, flow variation +/- 0.2%, bar 2.6	32, 32
4	2.69	mass (lbs) - 130, gal(US)/min 11.3, pressure +/- 1.1%, psi 37.0	68.4	mass (kg) - 59, m3/hr 2.6, flow variation +/- 0.5%, bar 2.6	32, 32, 32
5	2.70	mass (lbs) - 172, gal(US)/min 14.2, pressure +/- 2.2%, psi 37.8	68.6	mass (kg) - 78, m3/hr 3.2, flow variation +/- 1.0%, bar 2.7	32, 32, 32, 32
6	2.72	mass (lbs) - 213, gal(US)/min 17.1, pressure +/- 3.8%, psi 39.0	69.0	mass (kg) - 97, m3/hr 3.9, flow variation +/- 1.6%, bar 2.7	32, 32, 32, 32, 32
7	2.73	mass (lbs) - 255, gal(US)/min 20.1, pressure +/- 6.1%, psi 40.6	69.4	mass (kg) - 116, m3/hr 4.6, flow variation +/- 2.4%, bar 2.9	32, 32, 32, 32, 32, 32
8	2.76	mass (lbs) - 297, gal(US)/min 23.1, pressure +/- 9.1%, psi 42.8	70.0	mass (kg) - 135, m3/hr 5.2, flow variation +/- 3.2%, bar 3.0	32, 32, 32, 32, 32, 32, 32
9	2.77	mass (lbs) - 366, gal(US)/min 26.1, pressure +/- 8.9%, psi 42.7	70.3	mass (kg) - 166, m3/hr 5.9, flow variation +/- 2.3%, bar 3.0	40, 40, 32, 32, 32, 32, 32, 32
10	2.78	mass (lbs) - 435, gal(US)/min 29.1, pressure +/- 9.5%, psi 43.2	70.5	mass (kg) - 197, m3/hr 6.6, flow variation +/- 2.1%, bar 3.0	40, 40, 40, 40, 32, 32, 32, 32, 32
11	2.76	mass (lbs) - 530, gal(US)/min 31.9, pressure +/- 9.8%, psi 43.4	70.2	mass (kg) - 240, m3/hr 7.2, flow variation +/- 2.6%, bar 3.0	40, 40, 40, 40, 40, 40, 40, 40, 40, 32, 32
12	2.77	mass (lbs) - 643, gal(US)/min 34.9, pressure +/- 9.7%, psi 43.3	70.3	mass (kg) - 291, m3/hr 7.9, flow variation +/- 2.0%, bar 3.0	45, 45, 40, 40, 40, 40, 40, 40, 40, 40, 40, 40
13	2.77	mass (lbs) - 743, gal(US)/min 37.8, pressure +/- 9.5%, psi 43.2	70.3	mass (kg) - 337, m3/hr 8.6, flow variation +/- 1.8%, bar 3.0	45, 45, 45, 45, 45, 40, 40, 40, 40, 40, 40, 40, 40

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	Pods
2.99	mass (lbs) - 186, gal(US)/min 18.8, pressure +/- 3.5%, psi 49.7	75.9	mass (kg) - 84, m3/hr 4.3, flow variation +/- 1.7%, bar 3.5	6

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Green Nozzle),Minimum Pressure of 2.7 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 39.2 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.70 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	pressure +/-	psi	mass (kg)	m3/hr	flow variation +/-	bar	Pods
3	2.79	88	70.9	40	88	8.8	0.4%	39.5	40	2.0	0.2%	2.8	32 32
4	2.80	130	71.1	59	130	11.7	1.1%	40.0	59	2.7	0.5%	2.8	32 32 32 32
5	2.81	172	71.4	78	172	14.7	2.1%	40.8	78	3.3	1.0%	2.9	32 32 32 32 32
6	2.82	213	71.7	97	213	17.8	3.8%	42.1	97	4.0	1.6%	3.0	32 32 32 32 32 32
7	2.84	255	72.2	116	255	20.9	6.0%	43.9	116	4.7	2.3%	3.1	32 32 32 32 32 32 32
8	2.87	297	72.8	135	297	24.1	9.0%	46.2	135	5.5	3.1%	3.2	32 32 32 32 32 32 32 32
9	2.88	366	73.1	166	366	27.2	8.8%	46.1	166	6.2	2.3%	3.2	40 40 32 32 32 32 32 32
10	2.89	435	73.3	197	435	30.3	9.5%	46.6	197	6.9	2.1%	3.3	40 40 40 40 32 32 32 32 32
11	2.87	530	72.9	240	530	33.1	9.8%	46.8	240	7.5	2.6%	3.3	40 40 40 40 40 40 40 40 40 32 32
12	2.88	643	73.1	291	643	36.2	9.6%	46.7	291	8.2	1.9%	3.3	45 45 40 40 40 40 40 40 40 40 40 40
13	2.88	743	73.1	337	743	39.3	9.4%	46.5	337	8.9	1.8%	3.3	45 45 45 45 45 40 40 40 40 40 40 40 40

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	pressure +/-	psi	mass (kg)	m3/hr	flow variation +/-	bar
2.99	6	75.9	84	186	18.8	3.5%	49.7	84	4.3	1.7%	3.5

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Green Nozzle),Minimum Pressure of 3 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 43.5 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.00 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	psi	mass (kg)	m3/hr	bar	pressure +/-	flow variation +/-	Pods
3	2.94	3	74.8	3	88	9.3	43.9	40	2.1	3.1	0.4%	0.2%	32 32
4	2.95	4	75.0	4	130	12.4	44.4	59	2.8	3.1	1.1%	0.5%	32 32 32 32
5	2.96	5	75.3	5	172	15.5	45.3	78	3.5	3.2	2.1%	1.0%	32 32 32 32 32
6	2.98	6	75.6	6	213	18.7	46.7	97	4.3	3.3	3.7%	1.6%	32 32 32 32 32 32
7	3.00	7	76.1	7	255	22.0	48.7	116	5.0	3.4	5.9%	2.3%	32 32 32 32 32 32 32
8	3.02	8	76.8	8	297	25.4	51.2	135	5.8	3.6	8.9%	3.1%	32 32 32 32 32 32 32 32
9	3.04	9	77.1	9	366	28.7	51.1	166	6.5	3.6	8.7%	2.3%	40 40 32 32 32 32 32 32
10	3.04	10	77.3	10	435	31.9	51.6	197	7.2	3.6	9.4%	2.1%	40 40 40 40 32 32 32 32 32
11	3.03	11	76.9	11	530	34.9	51.9	240	7.9	3.6	9.6%	2.6%	40 40 40 40 40 40 40 40 40 32 32
12	3.04	12	77.1	12	643	38.2	51.8	291	8.7	3.6	9.5%	1.9%	45 45 40 40 40 40 40 40 40 40 40 40
13	3.04	13	77.1	13	743	41.4	51.6	337	9.4	3.6	9.3%	1.8%	45 45 45 45 45 40 40 40 40 40 40 40 40

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	psi	mass (kg)	m3/hr	bar	pressure +/-	flow variation +/-
2.99	6	75.9	6	186	18.8	49.7	84	4.3	3.5	3.5%	1.7%

< 15m > 40mm | < 15m > 40mm | < 15m > 40mm | <End of Line>

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Green Nozzle),Minimum Pressure of 3.2 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 46.4 psi

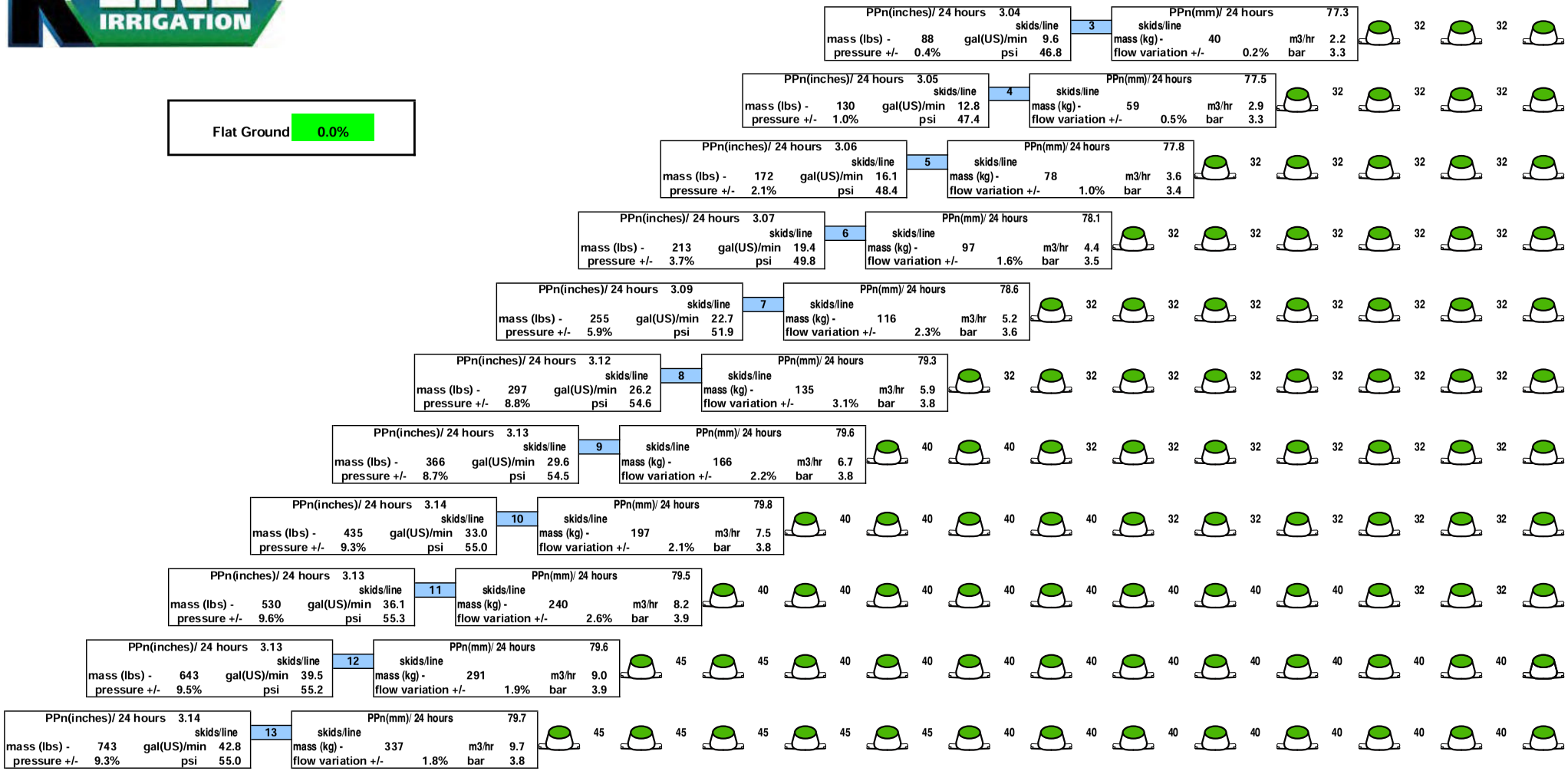
Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.20 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line
3	3.04		77.3	
	mass (lbs) - 88	gal(US)/min 9.6	mass (kg) - 40	m3/hr 2.2
	pressure +/- 0.4%	psi 46.8	flow variation +/- 0.2%	bar 3.3
4	3.05		77.5	
	mass (lbs) - 130	gal(US)/min 12.8	mass (kg) - 59	m3/hr 2.9
	pressure +/- 1.0%	psi 47.4	flow variation +/- 0.5%	bar 3.3
5	3.06		77.8	
	mass (lbs) - 172	gal(US)/min 16.1	mass (kg) - 78	m3/hr 3.6
	pressure +/- 2.1%	psi 48.4	flow variation +/- 1.0%	bar 3.4
6	3.07		78.1	
	mass (lbs) - 213	gal(US)/min 19.4	mass (kg) - 97	m3/hr 4.4
	pressure +/- 3.7%	psi 49.8	flow variation +/- 1.6%	bar 3.5
7	3.09		78.6	
	mass (lbs) - 255	gal(US)/min 22.7	mass (kg) - 116	m3/hr 5.2
	pressure +/- 5.9%	psi 51.9	flow variation +/- 2.3%	bar 3.6
8	3.12		79.3	
	mass (lbs) - 297	gal(US)/min 26.2	mass (kg) - 135	m3/hr 5.9
	pressure +/- 8.8%	psi 54.6	flow variation +/- 3.1%	bar 3.8
9	3.13		79.6	
	mass (lbs) - 366	gal(US)/min 29.6	mass (kg) - 166	m3/hr 6.7
	pressure +/- 8.7%	psi 54.5	flow variation +/- 2.2%	bar 3.8
10	3.14		79.8	
	mass (lbs) - 435	gal(US)/min 33.0	mass (kg) - 197	m3/hr 7.5
	pressure +/- 9.3%	psi 55.0	flow variation +/- 2.1%	bar 3.8
11	3.13		79.5	
	mass (lbs) - 530	gal(US)/min 36.1	mass (kg) - 240	m3/hr 8.2
	pressure +/- 9.6%	psi 55.3	flow variation +/- 2.6%	bar 3.9
12	3.13		79.6	
	mass (lbs) - 643	gal(US)/min 39.5	mass (kg) - 291	m3/hr 9.0
	pressure +/- 9.5%	psi 55.2	flow variation +/- 1.9%	bar 3.9
13	3.14		79.7	
	mass (lbs) - 743	gal(US)/min 42.8	mass (kg) - 337	m3/hr 9.7
	pressure +/- 9.3%	psi 55.0	flow variation +/- 1.8%	bar 3.8



Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line
6	2.99		75.9	
	mass (lbs) - 186	gal(US)/min 18.8	mass (kg) - 84	m3/hr 4.3
	pressure +/- 3.5%	psi 49.7	flow variation +/- 1.7%	bar 3.5

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Blue Nozzle),Minimum Pressure of 2.5 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 36.3 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.50 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line			
3	3.09	3	78.6	3	32	32	
4	3.10	4	78.8	4	32	32	32
5	3.12	5	79.2	5	32	32	32	32
6	3.13	6	79.6	6	32	32	32	32	32
7	3.16	7	80.3	7	32	32	32	32	32	32
8	3.19	8	80.9	8	40	32	32	32	32	32	32
9	3.20	9	81.2	9	40	40	40	32	32	32	32	32
10	3.19	10	81.0	10	40	40	40	40	40	40	32	32	32
11	3.19	11	80.9	11	45	45	40	40	40	40	40	40	40	40	40
12	3.19	12	81.1	12	45	45	45	45	40	40	40	40	40	40	40	40
13	3.18	13	80.7	13	45	45	45	45	45	45	45	45	45	40	40	40

	PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar
3	3.09	3	88	9.7	0.5%	36.6	78.6	3	40	2.2	0.3%	2.6
4	3.10	4	130	13.0	1.4%	37.2	78.8	4	59	3.0	0.7%	2.6
5	3.12	5	172	16.3	2.8%	38.3	79.2	5	78	3.7	1.3%	2.7
6	3.13	6	213	19.7	4.9%	39.8	79.6	6	97	4.5	2.0%	2.8
7	3.16	7	255	23.2	7.8%	41.9	80.3	7	116	5.3	2.9%	2.9
8	3.19	8	310	26.7	9.4%	43.1	80.9	8	141	6.1	2.9%	3.0
9	3.20	9	379	30.2	9.7%	43.3	81.2	9	172	6.8	2.1%	3.0
10	3.19	10	462	33.5	10.2%	43.6	81.0	10	209	7.6	2.7%	3.1
11	3.19	11	587	36.8	9.5%	43.1	80.9	11	266	8.3	2.0%	3.0
12	3.19	12	673	40.2	10.2%	43.7	81.1	12	305	9.1	1.9%	3.1
13	3.18	13	803	43.4	10.0%	43.5	80.7	13	364	9.8	2.3%	3.1

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar
2.99	6	186	18.8	3.5%	49.7	75.9	6	84	4.3	1.7%	3.5

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Blue Nozzle),Minimum Pressure of 2.7 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 39.2 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.70 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	psi	mass (kg)	m3/hr	bar	pressure +/-	flow variation +/-	Pods
3	3.21	81.6	3	88	10.1	39.6	40	2.3	2.8	0.5%	0.3%	32 32
4	3.22	81.9	4	130	13.5	40.2	59	3.1	2.8	1.4%	0.7%	32 32 32 32
5	3.24	82.2	5	172	17.0	41.3	78	3.9	2.9	2.8%	1.3%	32 32 32 32 32
6	3.26	82.7	6	213	20.5	42.9	97	4.7	3.0	4.8%	2.0%	32 32 32 32 32 32
7	3.28	83.4	7	255	24.1	45.2	116	5.5	3.2	7.7%	2.9%	32 32 32 32 32 32 32
8	3.31	84.1	8	310	27.8	46.4	141	6.3	3.3	9.3%	2.9%	40 32 32 32 32 32 32 32
9	3.32	84.3	9	379	31.3	46.7	172	7.1	3.3	9.7%	2.1%	40 40 40 32 32 32 32 32
10	3.31	84.1	10	462	34.7	47.0	209	7.9	3.3	10.1%	2.6%	40 40 40 40 40 40 32 32 32
11	3.31	84.0	11	587	38.2	46.5	266	8.7	3.3	9.4%	2.0%	45 45 40 40 40 40 40 40 40 40 40
12	3.32	84.3	12	673	41.8	47.1	305	9.5	3.3	10.1%	1.9%	45 45 45 45 40 40 40 40 40 40 40 40
13	3.30	83.8	13	803	45.0	46.9	364	10.2	3.3	9.9%	2.2%	45 45 45 45 45 45 45 45 45 40 40 40

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	psi	mass (kg)	m3/hr	bar	pressure +/-	flow variation +/-
2.99	75.9	6	186	18.8	49.7	84	4.3	3.5	3.5%	1.7%

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Blue Nozzle),Minimum Pressure of 3 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 43.5 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.00 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	pressure +/-	psi	mass (kg)	m3/hr	flow variation +/-	bar	Pods
3	3.39	88	86.0	40	88	10.7	0.5%	44.0	40	2.4	0.3%	3.1	32, 32
4	3.39	130	86.2	59	130	14.3	1.3%	44.7	59	3.2	0.7%	3.1	32, 32, 32
5	3.41	172	86.6	78	172	17.9	2.7%	45.9	78	4.1	1.2%	3.2	32, 32, 32, 32
6	3.43	213	87.1	97	213	21.6	4.8%	47.6	97	4.9	2.0%	3.3	32, 32, 32, 32, 32, 32
7	3.46	255	87.8	116	255	25.4	7.6%	50.1	116	5.8	2.9%	3.5	32, 32, 32, 32, 32, 32, 32
8	3.48	310	88.5	141	310	29.3	9.2%	51.5	141	6.6	2.9%	3.6	40, 32, 32, 32, 32, 32, 32, 32
9	3.50	379	88.8	172	379	33.0	9.5%	51.8	172	7.5	2.1%	3.6	40, 40, 40, 32, 32, 32, 32, 32
10	3.49	462	88.6	209	462	36.6	9.9%	52.1	209	8.3	2.6%	3.6	40, 40, 40, 40, 40, 40, 32, 32, 32
11	3.48	587	88.5	266	587	40.2	9.3%	51.6	266	9.1	2.0%	3.6	45, 45, 40, 40, 40, 40, 40, 40, 40, 40
12	3.49	673	88.7	305	673	44.0	10.0%	52.2	305	10.0	1.9%	3.6	45, 45, 45, 45, 40, 40, 40, 40, 40, 40, 40, 40
13	3.48	803	88.3	364	803	47.4	9.8%	52.0	364	10.8	2.2%	3.6	45, 45, 45, 45, 45, 45, 45, 45, 45, 40, 40, 40, 40

Average application rate millimetres per 24 hours

Number of pods per line

PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	pressure +/-	psi	mass (kg)	m3/hr	flow variation +/-	bar
2.99	6	75.9	186	186	18.8	3.5%	49.7	84	4.3	1.7%	3.5

Selection of Pipe for each 15 metre section

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Blue Nozzle),Minimum Pressure of 3.2 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 46.4 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.20 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours	skids/line																				
1	3.50	3	88.8	3	32	32																		
2	3.50	4	89.0	4	32	32	32																	
3	3.52	5	89.4	5	32	32	32	32																
4	3.54	6	90.0	6	32	32	32	32	32															
5	3.57	7	90.7	7	32	32	32	32	32	32														
6	3.60	8	91.4	8	40	32	32	32	32	32	32													
7	3.61	9	91.6	9	40	40	40	32	32	32	32	32												
8	3.60	10	91.4	10	40	40	40	40	40	40	32	32	32											
9	3.59	11	91.3	11	45	45	40	40	40	40	40	40	40	40										
10	3.61	12	91.6	12	45	45	45	45	40	40	40	40	40	40	40									
11	3.59	13	91.2	13	45	45	45	45	45	45	45	45	45	40	40	40								

	mass (lbs) -	gal(US)/min	psi	mass (kg) -	m3/hr	bar	pressure +/-	flow variation +/-
1	88	11.0	46.9	40	2.5	3.3	0.5%	0.3%
2	130	14.7	47.6	59	3.3	3.3	1.3%	0.6%
3	172	18.5	48.9	78	4.2	3.4	2.7%	1.2%
4	213	22.3	50.8	97	5.1	3.6	4.7%	2.0%
5	255	26.2	53.4	116	5.9	3.7	7.6%	2.8%
6	310	30.2	54.9	141	6.8	3.8	9.1%	2.9%
7	379	34.1	55.2	172	7.7	3.9	9.4%	2.0%
8	462	37.8	55.5	209	8.6	3.9	9.8%	2.6%
9	587	41.5	54.9	266	9.4	3.8	9.2%	2.0%
10	673	45.4	55.6	305	10.3	3.9	9.9%	1.9%
11	803	49.0	55.4	364	11.1	3.9	9.7%	2.2%

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	PPn(mm)/ 24 hours
2.99	6	75.9

mass (lbs) -	gal(US)/min	psi	mass (kg) -	m3/hr	bar	pressure +/-	flow variation +/-
186	18.8	49.7	84	4.3	3.5	3.5%	1.7%

< 15m > 40mm | < 15m > 40mm | < 15m > 40mm | <End of Line>

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required pressure at the start of the line

Required flow rate (total) for the line

Naan 5022 (Black Nozzle),Minimum Pressure of 2.5 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 36.3 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.50 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar	Pods
3	4.00		88	12.6	0.8%	36.9	101.5		40	2.9	0.4%	2.6	32, 32
4	4.02		130	16.9	2.2%	37.8	102.0		59	3.8	1.0%	2.7	32, 32, 32
5	4.04		172	21.2	4.4%	39.4	102.6		78	4.8	1.9%	2.8	32, 32, 32, 32
6	4.08		213	25.7	7.7%	41.8	103.6		97	5.8	3.0%	2.9	32, 32, 32, 32, 32
7	4.11		269	30.2	9.6%	43.2	104.5		122	6.9	3.2%	3.0	40, 32, 32, 32, 32, 32, 32
8	4.13		338	34.6	10.2%	43.7	104.8		153	7.9	2.4%	3.1	40, 40, 40, 32, 32, 32, 32
9	4.10		462	38.7	9.1%	42.8	104.1		209	8.8	2.5%	3.0	45, 40, 40, 40, 40, 40, 40, 40
10	4.11		547	43.2	9.7%	43.3	104.5		248	9.8	1.9%	3.0	45, 45, 45, 40, 40, 40, 40, 40, 40
11	4.10		662	47.3	9.9%	43.4	104.1		300	10.7	2.4%	3.0	45, 45, 45, 45, 45, 45, 45, 40, 40, 40
12	4.11		777	51.8	12.1%	45.1	104.5		352	11.8	2.8%	3.2	45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45
13	4.15		848	56.6	15.4%	47.4	105.3		384	12.8	3.2%	3.3	45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

	PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar
6	2.99		186	18.8	3.5%	49.7	75.9		84	4.3	1.7%	3.5

< 15m > 40mm | < 15m > 40mm | < 15m > 40mm | <End of Line>

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Black Nozzle),Minimum Pressure of 2.7 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 39.2 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 2.70 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

Line	PPn(inches)/ 24 hours	mass (lbs)	pressure +/-	gal(US)/min	psi	skids/line	PPn(mm)/ 24 hours	mass (kg)	flow variation +/-	m3/hr	bar	skids/line	Pods
3	4.15	88	0.8%	13.1	39.8		105.3	40	0.4%	3.0	2.8		32, 32
4	4.16	130	2.1%	17.5	40.8		105.7	59	1.0%	4.0	2.9		32, 32, 32
5	4.19	172	4.3%	22.0	42.5		106.4	78	1.9%	5.0	3.0		32, 32, 32, 32
6	4.23	213	7.6%	26.6	45.1		107.4	97	3.0%	6.0	3.2		32, 32, 32, 32, 32
7	4.26	269	9.5%	31.3	46.6		108.3	122	3.1%	7.1	3.3		40, 32, 32, 32, 32, 32
8	4.28	338	10.1%	35.9	47.0		108.6	153	2.4%	8.1	3.3		40, 40, 40, 32, 32, 32, 32
9	4.25	462	9.0%	40.1	46.2		107.9	209	2.5%	9.1	3.2		45, 40, 40, 40, 40, 40, 40, 40, 40
10	4.26	547	9.6%	44.7	46.7		108.3	248	1.9%	10.1	3.3		45, 45, 45, 40, 40, 40, 40, 40, 40
11	4.25	662	9.8%	49.1	46.8		108.0	300	2.4%	11.1	3.3		45, 45, 45, 45, 45, 45, 45, 40, 40, 40
12	4.26	777	12.0%	53.7	48.5		108.3	352	2.8%	12.2	3.4		45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45
13	4.30	848	15.2%	58.6	51.1		109.2	384	3.2%	13.3	3.6		45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	mass (lbs)	pressure +/-	gal(US)/min	psi	skids/line	PPn(mm)/ 24 hours	mass (kg)	flow variation +/-	m3/hr	bar	skids/line
2.99	186	3.5%	18.8	49.7	6	75.9	84	1.7%	4.3	3.5	

< 15m > 40mm | < 15m > 40mm | < 15m > 40mm | <End of Line>

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Black Nozzle),Minimum Pressure of 3 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 43.5 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.00 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

	PPn(inches)/ 24 hours	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	psi	mass (kg)	m3/hr	bar	pressure +/-	flow variation +/-
3	4.36	110.7	32 32	88	13.7	44.2	40	3.1	3.1	0.8%	0.4%
4	4.37	111.1	32 32 32	130	18.4	45.3	59	4.2	3.2	2.1%	1.0%
5	4.40	111.8	32 32 32 32	172	23.1	47.2	78	5.2	3.3	4.2%	1.8%
6	4.44	112.8	32 32 32 32 32	213	28.0	50.0	97	6.3	3.5	7.5%	2.9%
7	4.48	113.8	40 32 32 32 32 32	269	32.9	51.6	122	7.5	3.6	9.3%	3.1%
8	4.49	114.1	40 40 40 32 32 32 32	338	37.7	52.1	153	8.6	3.6	9.9%	2.3%
9	4.46	113.4	45 40 40 40 40 40 40 40	462	42.2	51.2	209	9.6	3.6	8.8%	2.4%
10	4.48	113.8	45 45 45 40 40 40 40 40	547	47.0	51.7	248	10.7	3.6	9.5%	1.9%
11	4.46	113.4	45 45 45 45 45 45 45 40 40 40	662	51.6	51.8	300	11.7	3.6	9.6%	2.3%
12	4.48	113.8	45 45 45 45 45 45 45 45 45 45 45	777	56.4	53.8	352	12.8	3.8	11.8%	2.7%
13	4.52	114.7	45 45 45 45 45 45 45 45 45 45 45 45	848	61.6	56.5	384	14.0	3.9	14.9%	3.1%

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	PPn(mm)/ 24 hours	skids/line	mass (lbs)	gal(US)/min	psi	mass (kg)	m3/hr	bar	pressure +/-	flow variation +/-
2.99	75.9	6	186	18.8	49.7	84	4.3	3.5	3.5%	1.7%

< 15m > 40mm *< 15m > 40mm* *< 15m > 40mm* *<End of Line>*

Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line

Naan 5022 (Black Nozzle),Minimum Pressure of 3.2 bar at the last sprinkler and spacings of 15 metres x 15 metres

Hours= 24

Minimum Pressure psi= 46.4 psi

Distance of skids= 49.2 ft x 49.2 Area= 2422 ft²

minimum pressure (bar) = 3.20 bar

distance between skids =15.0m x 15.0mArea= 225 m2

Flat Ground 0.0%

Line	PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar	Pods
3	4.49		88	14.1	0.8%	47.2	114.1		40	3.2	0.4%	3.3	32, 32
4	4.51		130	18.9	2.1%	48.3	114.6		59	4.3	1.0%	3.4	32, 32, 32
5	4.54		172	23.8	4.2%	50.3	115.3		78	5.4	1.8%	3.5	32, 32, 32, 32
6	4.58		213	28.8	7.4%	53.3	116.3		97	6.5	2.9%	3.7	32, 32, 32, 32, 32, 32
7	4.62		269	33.9	9.2%	55.0	117.3		122	7.7	3.0%	3.8	40, 32, 32, 32, 32, 32, 32
8	4.63		338	38.9	9.8%	55.5	117.6		153	8.8	2.3%	3.9	40, 40, 40, 32, 32, 32, 32
9	4.60		462	43.5	8.7%	54.5	116.9		209	9.9	2.4%	3.8	45, 40, 40, 40, 40, 40, 40, 40
10	4.62		547	48.4	9.4%	55.1	117.3		248	11.0	1.9%	3.8	45, 45, 45, 40, 40, 40, 40, 40, 40
11	4.60		662	53.1	9.5%	55.2	116.9		300	12.1	2.3%	3.9	45, 45, 45, 45, 45, 45, 45, 40, 40, 40
12	4.62		777	58.2	11.7%	57.2	117.3		352	13.2	2.7%	4.0	45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45
13	4.65		848	63.5	14.8%	60.1	118.2		384	14.4	3.1%	4.2	45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45, 45

Average application rate millimetres per 24 hours

Number of pods per line

Selection of Pipe for each 15 metre section

PPn(inches)/ 24 hours	skids/line	mass (lbs) -	gal(US)/min	pressure +/-	psi	PPn(mm)/ 24 hours	skids/line	mass (kg) -	m3/hr	flow variation +/-	bar
2.99		186	18.8	3.5%	49.7	75.9		84	4.3	1.7%	3.5

6

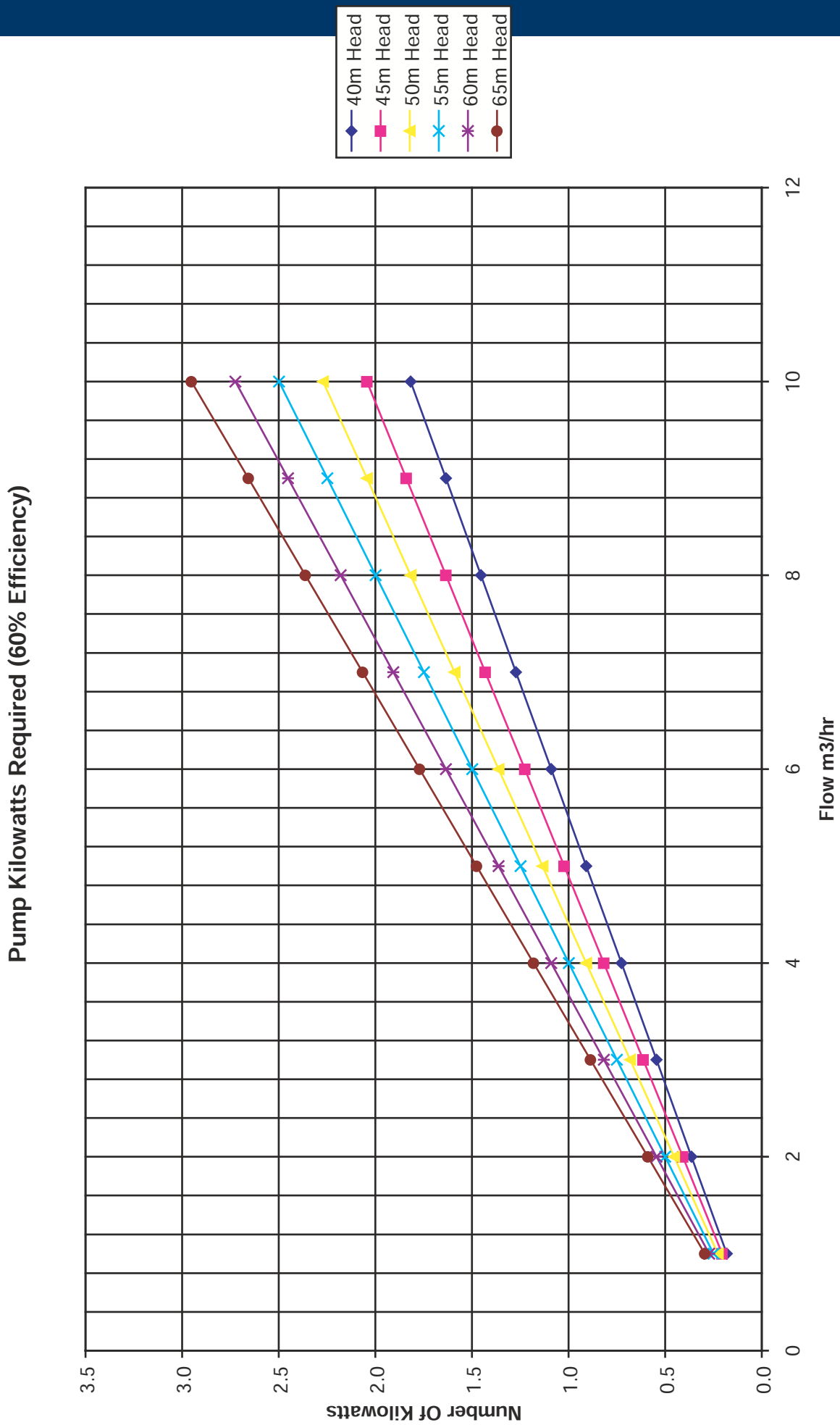
< 15m > 40mm | < 15m > 40mm | < 15m > 40mm | <End of Line>

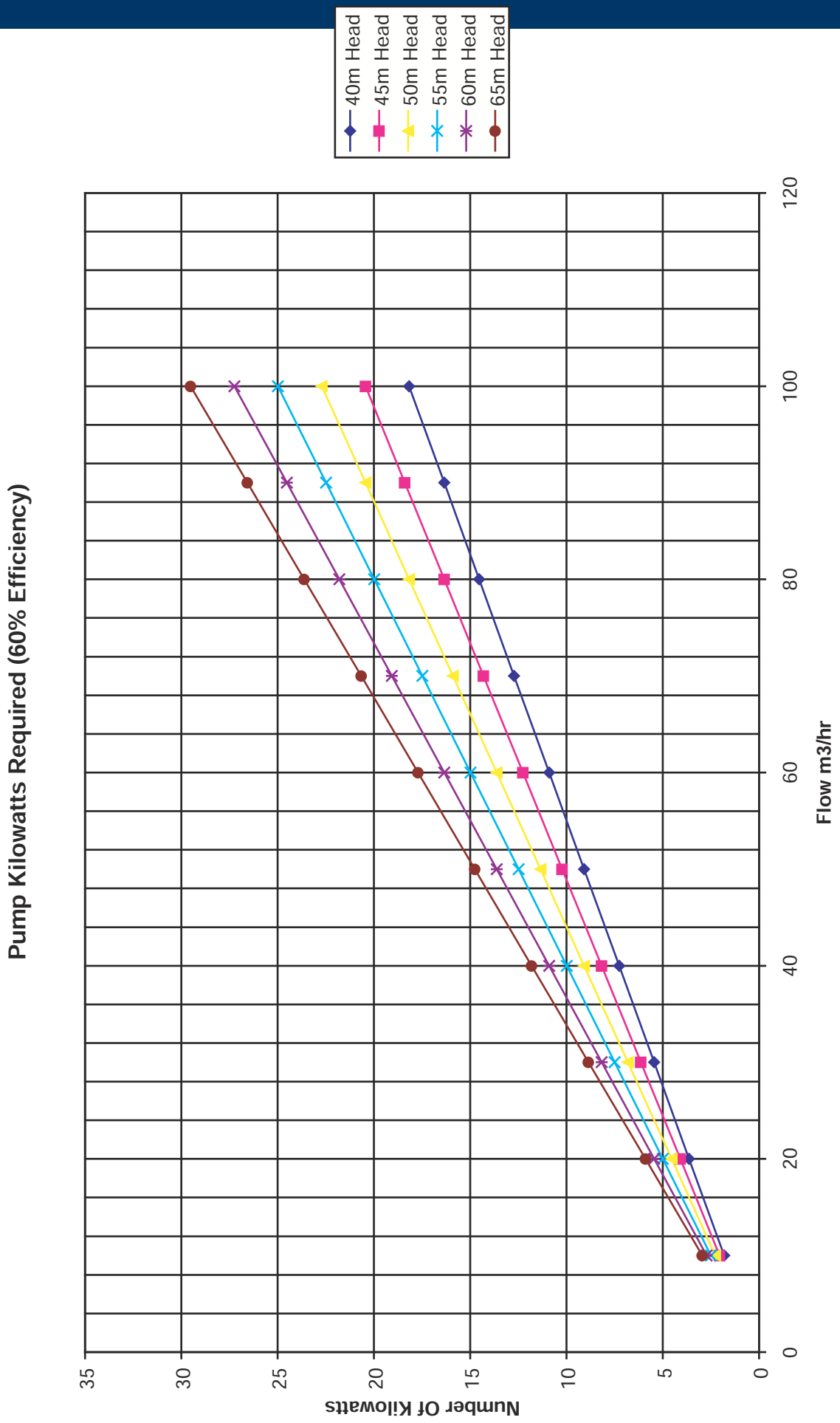
Variation (+/-) in Pressure along the K-Line (Should be no greater than +/-10%)

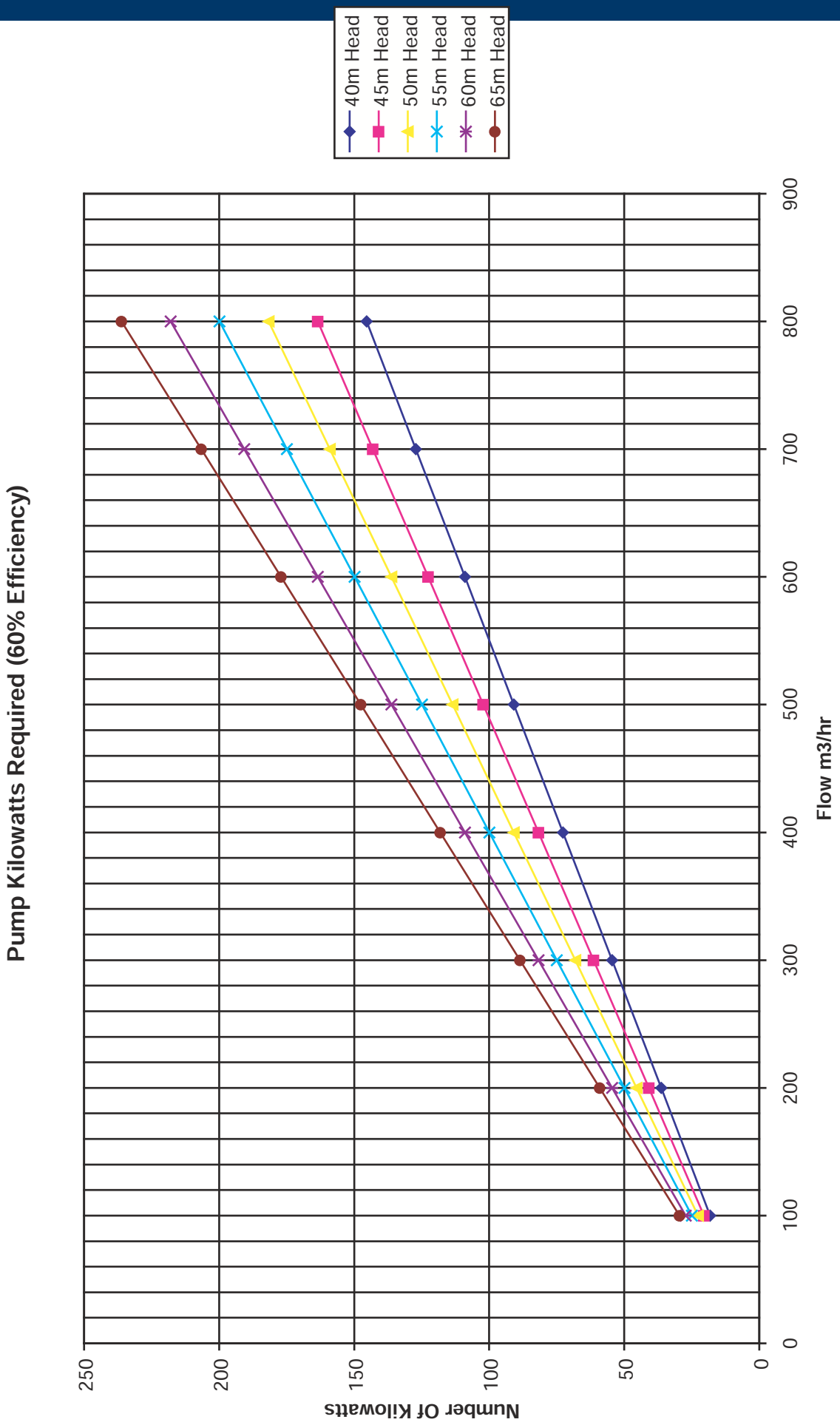
Variation (+/-) in Flow along the K-Line

Required flow rate (total) for the line

Required pressure at the start of the line


Pump Kilowatts Required (60% Efficiency)
40m Head
45m Head
50m Head
55m Head
60m Head
65m Head
Number Of Kilowatts
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
Flow m3/hr


Pump Kilowatts Required (60% Efficiency)
40m Head
45m Head
50m Head
55m Head
60m Head
65m Head
Number Of Kilowatts
0
5
10
15
20
25
30
35
Flow m3/hr
0
20
40
60
80
100
120


Pump Kilowatts Required (60% Efficiency)
40m Head
45m Head
50m Head
55m Head
60m Head
65m Head
Number Of Kilowatts
250
200
150
100
50
0
Flow m3/hr
0
100
200
300
400
500
600
700
800
900