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## **Pop-up Sprinkler Evaluation**

### ***Rain Bird 5000PRS Rotor***

February 2008

***Adelaide, South Australia***

***Product evaluation of Rain Bird 5000PRS and water saving features***

Job No: A08001



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## SECTION 1: Rain Bird 5000PRS Sprinkler evaluation

### 1.1 Introduction

Aquatek Irrigation Pty. Ltd have been commissioned by Rain Bird International to independently evaluate the performance and water saving features of the Rain Bird 5000PRS Pop-up Sprinkler. This report is intended to provide supporting evidence for evaluation of the product for the Smart Approved Watermark scheme in Australia.

### 1.2 Methodology

The testing program and analysis is as follows:

1. Test the flow versus pressure relationship of the RB5000 as well as other performance comparable market brands. The other brands chosen were the Hunter PGP and the Toro V1550 Pop-up sprinklers. All sprinklers were tested with a range of comparable nozzles selected to represent quarter, half and full circle sprinklers in a matched precipitation system.
2. Create a typical in field scenario (desktop) and apply two scenarios:
  - a. A high operating pressure scenario which often occurs where users do not set sprinkler pressures (i.e. the system operates at maximum pressure capacity) or there are fluctuating mainline pressures.
  - b. A wide operating pressure range across sprinklers operating at the same time. This occurs when there are excessive pressure losses commonly by using too small a pipe diameter.
3. Analyse the results and report on water saving features of the product (if evident)

### 1.3 Performance Testing

The performance testing was carried out using a base mounted Pressure Gauge (i.e. under the sprinkler), adjusting the pressure and measuring the flow (volume over time to the nearest second).

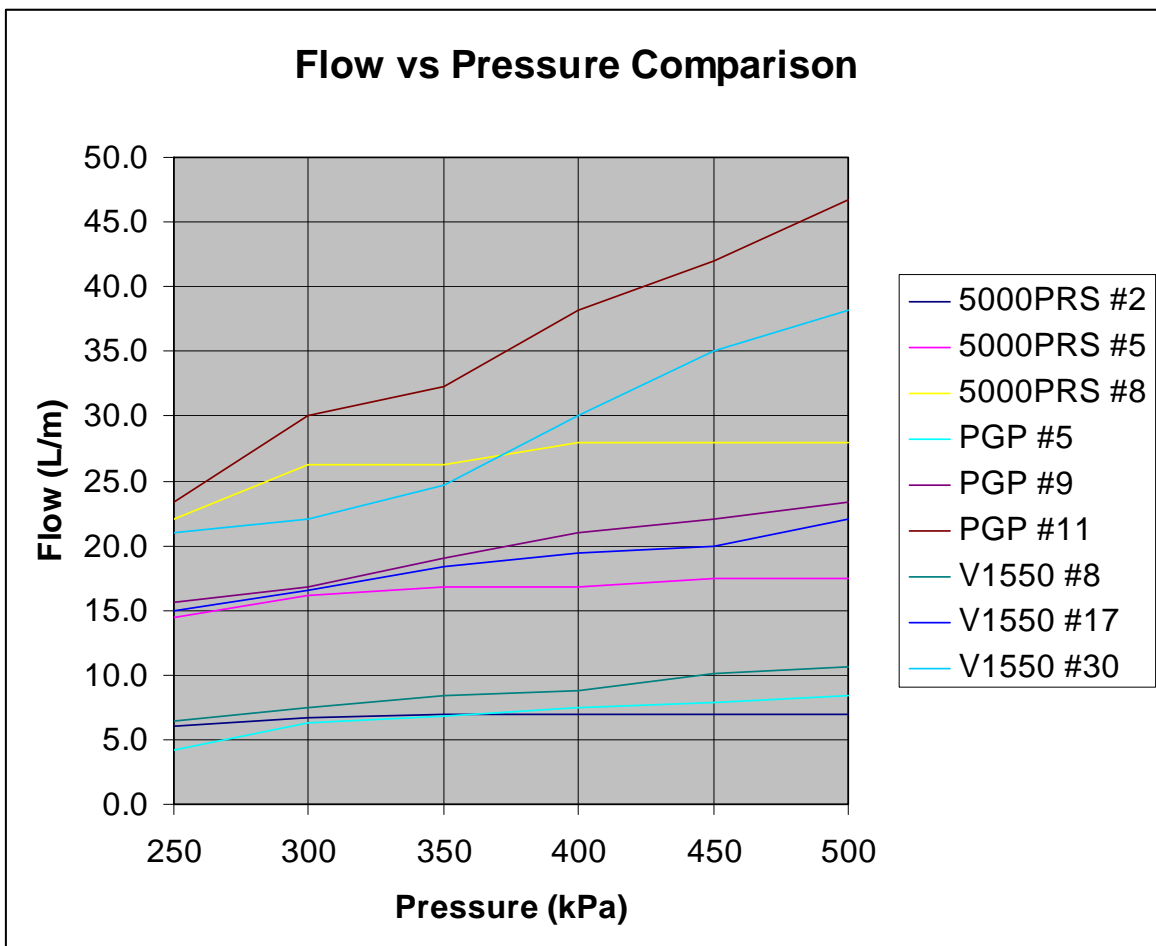
**1.4 Flow versus Pressure Test Results**

The performance testing on the products returned the following results:

**Flow Rate vs Pressure Test**

Make	Rainbird	Rainbird	Rainbird	Hunter	Hunter	Hunter	Toro	Toro	Toro
Model	5000PRS	5000PRS	5000PRS	PGP	PGP	PGP	V1550	V1550	V1550
Nozzle	#2	#5	#8	#5	#9	#11	#8	#17	#30
Pressure	Measured Flow Rate (L/m)								
250	6.0	14.5	22.1	4.2	15.6	23.3	6.4	15.0	21.0
300	6.7	16.2	26.3	6.3	16.8	30.0	7.4	16.5	22.1
350	7.0	16.8	26.3	6.8	19.1	32.3	8.4	18.3	24.7
400	7.0	16.8	28.0	7.5	21.0	38.2	8.8	19.4	30.0
450	7.0	17.5	28.0	7.9	22.1	42.0	10.2	20.0	35.0
500	7.0	17.5	28.0	8.4	23.3	46.7	10.6	22.1	38.2

*Table 1 – Flow versus Pressure Test results*

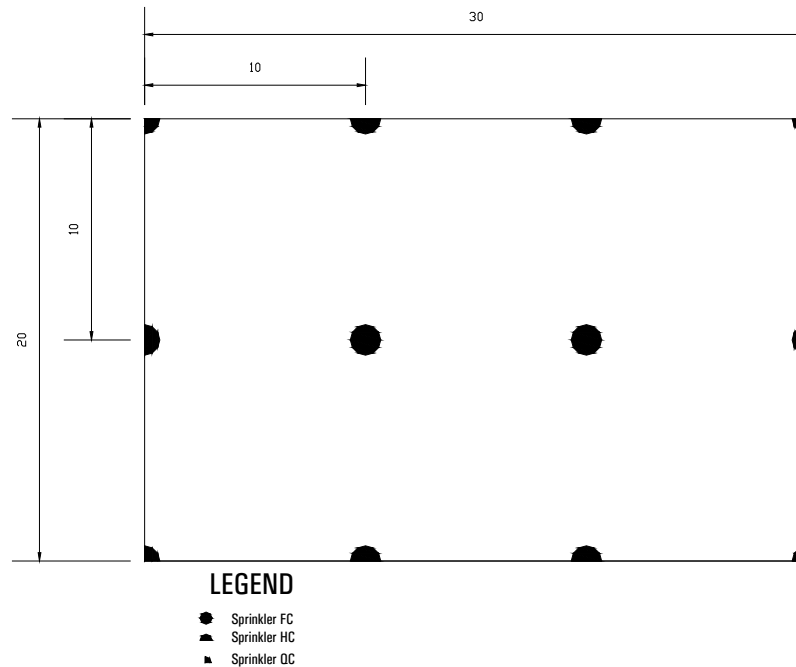


*Graph 1 – Flow versus pressure results*

All products tested were comparable with their published performance charts. The Rain Bird 5000PRS demonstrated it's pressure regulation from 300 to 500 kPa as published.

### 1.5 Typical Sprinkler Layout

A typical sprinkler layout used for comparisons is as shown below:



### 1.6 Scenario Analysis

Two typical scenarios were evaluated as follows:

#### 1.6.1 Scenario 1 – High Pressure

A scenario where higher pressure is experienced at the sprinkler heads. This occurs when no pressures are set at sprinkler control valves or where fluctuations in mainline pressure are experienced. The result on the above scenario is shown in the table below:

Sprinkler	Q/C	H/C	F/C	Total Flow	Precipitation Rate	Time to apply 25mm	Volume per 25mm	Volume per 450mm	Variation
No. Of Sprinklers	4	6	2	(L/m)	at 300 kPa (mm/hr)	(min)	(Litres)	(Litres)	(%)
High Pressure Scenario - 450kPa actual (Nominal = 300kPa)									
Rainbird 5000 PRS	28	105	56	189	15.8	95	17955	323190	100%
Hunter PGP	32	133	84	249	18.0	83	20667	372006	115%
Toro V1550	41	120	70	231	13.3	113	26103	469854	145%

The result is that the non pressure regulated sprinklers (PGP and V1550) would use more than 15% or 45% more water than the 5000PRS.

Over a typical annual application of 450mm on the above scenario would result in an extra 48816L for the PGP and 146664L for the V1550.

### 1.6.2 Scenario 2 – Wide pressure variation

Wide pressure variation occurs across pop-up sprinklers operating together as a result of too small a pipe size being used in the installation. This often occurs in the DIY Irrigation and non experienced contractor or where there are price not quality driven contracts. The result is as follows:

#### Pressure Variation Scenario

Sprinkler	Precipitation Rates (mm/hr)		Total Variation (%)	Excess Watering Variation required (%)
	Minimum at 300 kPa	Maximum at 500 kPa		
5000PRS	15.8	16.8	6%	3%
PGP	18	28	55%	28%
V1550	13.2	23	76%	38%

The pressure variation results in uneven application rates (for non pressure regulated product). The customer will vary their watering to the driest area (brown or bare patches) to compensate for this variation. The resultant over watering to achieve something more acceptable is in the order of half of the total variation.

The results indicate a negligible effect for the 5000PRS (3%) and between a 28% and 38% excess watering required for the other products evaluated.

### 1.7 Summary

The testing and analysis supports that the Rain Bird 5000PRS is a water saving product due to the pressure regulation it employs.

Whilst each field application of the product has differing variables effecting outcomes, these are the same for all product so this report has focused on the scenarios that make this product different to other comparable ones.

The Rain Bird 5000PRS demonstrates water savings in the order of 30 to 45% when compared to non pressure regulated product.

A non measured water saving (due to its variable nature) of the 5000PRS is wind effects of fine droplets from sprinklers operating at higher pressure. This can be significant but was not measured as part of this report but was noted in operating the various product.