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## **Pop-up Sprinkler Evaluation**

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

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***Adelaide, South Australia***

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

Job No: A08001/A12011

Version 2.0

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### Document Control

Version	Description	Date	Author	Checked
1.0	Report released	4/02/2008	D Ferber	D Ferber
2.0	Report reviewed into US Units	13/06/2012	D Ferber	D Ferber

## SECTION 1: Rain Bird 5000PRS Sprinkler evaluation

### 1.1 Introduction

Aquatek Irrigation Pty. Ltd has 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

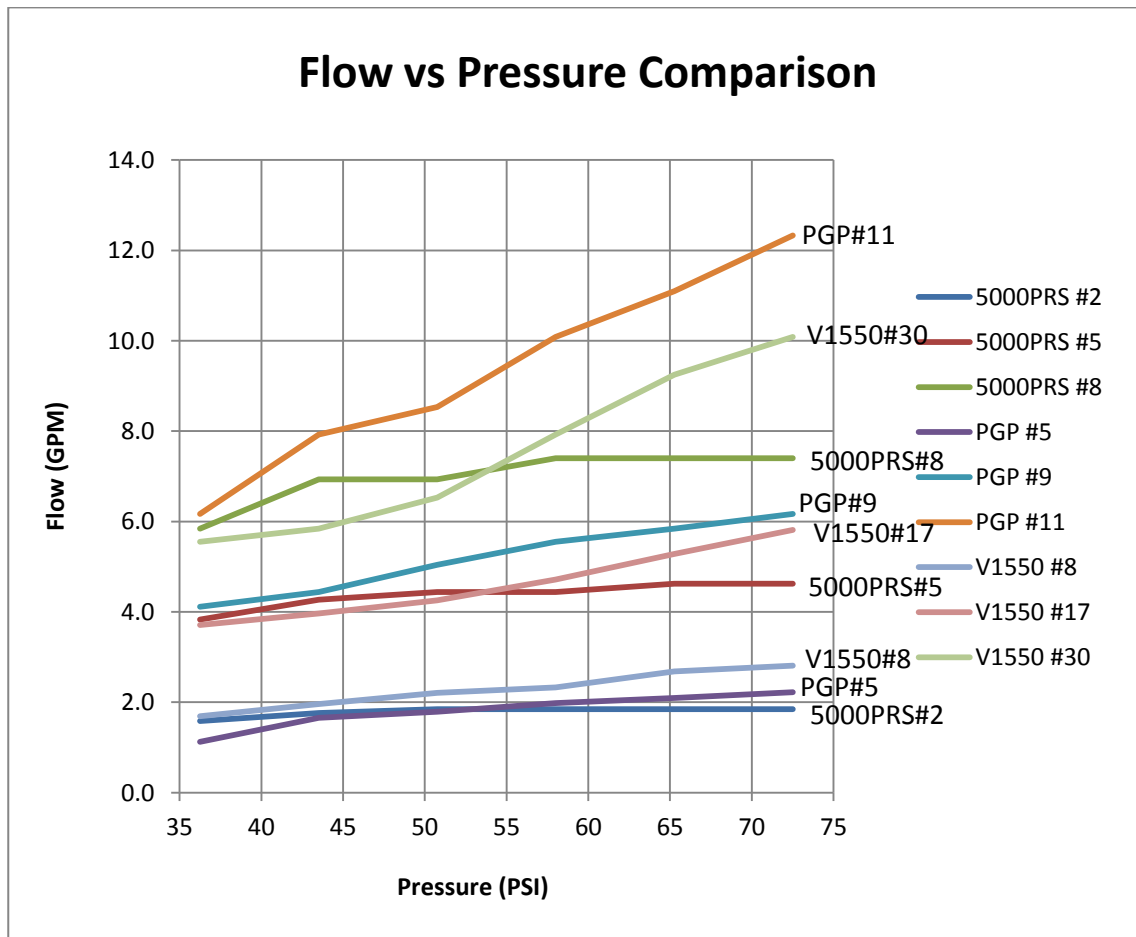
The performance testing was carried out using a base mounted Pressure Gauge (i.e. under the sprinkler), adjusting the pressure and measuring the flow (volume over time to the nearest second).

### 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 (PSI)	Measured Flow Rate (GPM)								
36	1.6	3.8	5.8	1.1	4.1	6.2	1.7	3.7	5.5
44	1.8	4.3	6.9	1.7	4.4	7.9	2.0	4.0	5.8
51	1.8	4.4	6.9	1.8	5.0	8.5	2.2	4.3	6.5
58	1.8	4.4	7.4	2.0	5.5	10.1	2.3	4.7	7.9
65	1.8	4.6	7.4	2.1	5.8	11.1	2.7	5.3	9.2
73	1.8	4.6	7.4	2.2	6.2	12.3	2.8	5.8	10.1

Table 1 – Flow versus Pressure Test results

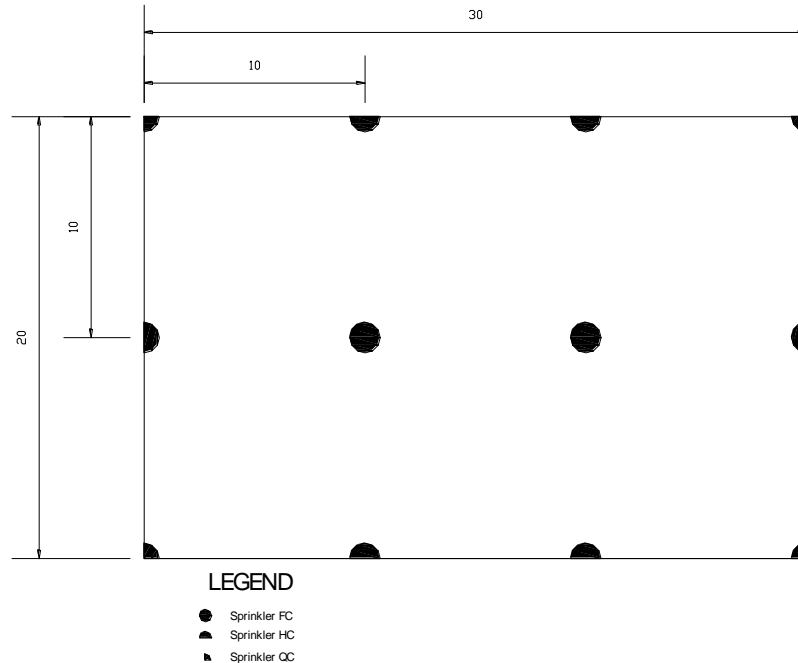


Graph 1 – Flow versus pressure results

All products tested were comparable with their published performance charts. The Rain Bird 5000PRS demonstrated its pressure regulation from 45 to 75 PSI as published.

### 1.5 Typical Sprinkler Layout

A typical sprinkler layout used for comparisons is as shown below. The sprinkler spacings are 33 feet x 33 feet (10m x 10m).



### 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 1"	Volume per 1"	Volume per 18"	Variation
No. Of Sprinklers	4	6	2	(GPM)	at 45 PSI (in/hr)	(min)	(Gallons)	(Gallons)	(%)
<b>High Pressure Scenario - 65PSI actual (Nominal = 45PSI)</b>									
Rainbird 5000 PRS	7.4	27.7	14.8	49.9	0.6	96	4816	86695	100%
Hunter PGP	8.4	35.0	22.2	65.6	0.7	85	5555	99988	115%
Toro V1550	10.7	31.7	18.5	60.9	0.5	115	6982	125669	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 18" on the above scenario would result in an extra 13293 Gallons for the PGP and 38974 Gallons 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:

<b>Pressure Variation Scenario</b>				
<b>Sprinkler</b>	<b>Precipitation Rates (in/hr)</b>		<b>Total Variation (%)</b>	<b>Excess Watering Variation required (%)</b>
	<b>Minimum at 44 PSI</b>	<b>Maximum at 73 PSI</b>		
	5000PRS	0.6		
PGP	0.7	1.1	56%	28%
V1550	0.5	0.9	74%	37%

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.