

US EPA ARCHIVE DOCUMENT



Advancements in Irrigation Efficiency

Saving Water in the Landscape

Presented by:

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Internalizing the IA Best Management Practices

- 1. ASSURE Overall QUALITY of the irrigation system*
- 2. DESIGN the irrigation system for the efficient and uniform distribution of water*
- 3. INSTALL the irrigation system to meet the design criteria*
- 4. MAINTAIN the irrigation system for optimum performance*
- 5. MANAGE the irrigation system to respond to the changing requirement for water in the landscape*

Visibility Creates Accountability



- Overspray onto hard surface
- Runoff
- Irrigation in the rain
- Leaks and breaks



Right Plant, Right Place = Right Application, Right Plant

Selection Factors:

- ❖ Physical site features
- ❖ Plant needs
- ❖ Growth habit
- ❖ Soil type
- ❖ Slope
- ❖ Root depth
- ❖ Cultural practice
- ❖ Wind
- ❖ Local Climate
- ❖ Microclimate
- ❖ Future use
- ❖ Available water supply
- ❖ Water window/Water restrictions

Drip Irrigation

- Flexible output
- Pressure compensating
- Direct applied
- Efficient application
- Low volume
- Broader water window
- Limited contact with water



Sprinkler Advancements

- Check valves
 - Prevent lateral pipes from draining between cycles through the sprinklers
 - Prevent erosion of sloped or newly seeded areas by “low head drainage”



Sprinkler Advancements

- Nozzle performance
 - Enhancing matched precipitation
 - Improved distribution uniformity
 - Patterns for irregular shaped areas



12 SERIES 30° SPRAY TRAJECTORY									
Nozzle	Arc	Pressure psi	Radius ft	Flow gpm	Precip. in/hr	Precip. in/hr			
I2 F	15	9	1.8	2.14	2.47				
		20	10	2.1	2.60	2.33			
		25	11	2.4	1.91	2.20			
I2 H	15	9	0.9	2.14	2.47				
		20	10	1.0	1.93	2.22			
		25	11	1.2	1.91	2.20			
I2 T	15	9	0.4	2.14	2.47				
		20	10	0.7	2.02	2.33			
		25	11	0.8	1.91	2.20			
I2 Q	15	9	0.5	2.14	2.47				
		20	10	0.5	1.93	2.22			
		25	11	0.6	1.91	2.20			
I2 TT	15	9	1.3	1.93	2.46				
		20	10	1.3	1.85	2.00			
		25	11	1.5	1.73	1.65			
I2 TQ	15	9	1.3	2.07	2.46				
		20	10	1.3	1.85	2.00			
		25	11	1.7	1.83	1.65			
I2 T	15	9	1.3	2.07	2.46				
		20	10	1.3	1.85	2.00			
		25	11	1.7	1.83	1.65			
I2 TQ	15	9	1.3	2.07	2.46				
		20	10	1.3	1.85	2.00			
		25	11	1.7	1.83	1.65			

15 SERIES 30° SPRAY TRAJECTORY									
Nozzle	Arc	Pressure psi	Radius ft	Flow gpm	Precip. in/hr	Precip. in/hr			
I5 F	15	11	2.6	2.07	2.19				
		20	12	1.9	2.00	2.12			
		25	14	3.3	1.62	1.87			
I5 H	15	11	1.3	2.07	2.19				
		20	12	1.5	2.01	2.12			
		25	14	1.7	1.67	1.93			
I5 T	15	11	0.9	2.15	2.18				
		20	12	1.0	2.01	2.12			
		25	14	1.1	1.62	1.87			
I5 Q	15	11	0.7	2.23	2.57				
		20	12	0.8	2.14	2.47			
		25	14	0.8	1.57	1.81			
I5 TT	15	11	1.4	1.96	2.29				
		20	12	1.5	1.96	2.00			
		25	14	2.3	1.55	1.47			
I5 TQ	15	11	2.3	2.24	2.19				
		20	12	2.5	2.20	2.00			
		25	14	2.8	1.62	1.47			

12 SERIES METRIC 30° SPRAY TRAJECTORY									
Nozzle	Arc	Pressure bar	Radius m	Flow l/min	Precip. mm/hr	Precip. mm/hr			
I2 F	15	0.6	0.5	8.1	56	65			
		1.4	3.0	0.40	53	62			
		1.7	3.3	0.55	51	58			
I2 H	15	0.4	0.27	0.20	55	63			
		1.4	3.0	0.23	51	59			
		1.7	3.3	0.27	50	57			
I2 T	15	0.2	0.27	0.14	58	67			
		1.4	3.0	0.16	53	62			
		1.7	3.3	0.18	50	57			
I2 Q	15	0.3	0.27	0.20	41	51			
		1.4	3.0	0.11	49	56			
		1.7	3.3	0.14	51	59			
I2 TT	15	1.0	2.7	0.31	48	70			
		1.4	3.0	0.29	48	53			
		1.7	3.3	0.33	45	53			
I2 TQ	15	1.0	2.7	0.30	55	65			
		1.4	3.0	0.25	51	53			
		1.7	3.3	0.40	49	41			

15 SERIES METRIC 30° SPRAY TRAJECTORY									
Nozzle	Arc	Pressure bar	Radius m	Flow l/min	Precip. mm/hr	Precip. mm/hr			
I5 F	15	0.8	3.4	8.19	51	59			
		1.4	3.7	0.48	50	57			
		1.7	4.3	0.25	41	47			
I5 H	15	0.8	3.4	8.10	52	60			
		1.4	3.7	0.34	50	57			
		1.7	4.3	0.39	42	49			
I5 T	15	0.8	3.7	8.20	52	60			
		1.4	3.7	0.23	50	58			
		1.7	4.3	0.25	41	47			
I5 Q	15	0.8	3.4	8.20	55	64			
		1.4	3.7	0.18	51	41			
		1.7	4.3	0.18	39	45			
I5 TT	15	1.0	3.4	8.30	49	68			
		1.4	3.7	0.44	48	58			
		1.7	4.3	0.48	39	48			
I5 TQ	15	1.0	3.4	8.49	51	60			
		1.4	3.7	0.57	54	58			
		1.7	4.3	0.64	46	48			

5 STREAM BUBBLER SERIES 30° SPRAY TRAJECTORY										
Nozzle	Pressure psi	Radius ft	Flow gpm	Precip. in/hr	Precip. in/hr					
5 FB	15	5	1.5	1.0	1.5	0.34				
		20	5	1.5	1.4	1.5	0.24			
		25	5	1.5	1.7	1.5	0.34			
5 HB	15	5	1.0	2.1	1.5	0.34				
		20	5	1.0	1.4	1.5	0.23			
		25	5	1.0	1.7	1.5	0.34			
5 QB	15	5	0.5	1.0	1.5	0.31				
		20	5	0.5	1.4	1.5	0.11			
		25	5	0.5	1.7	1.5	0.11			
5 CST-B	15	5	0.5	1.0	1.5	0.11				
		20	5	0.5	1.4	1.5	0.11			
		25	5	0.5	1.7	1.5	0.11			

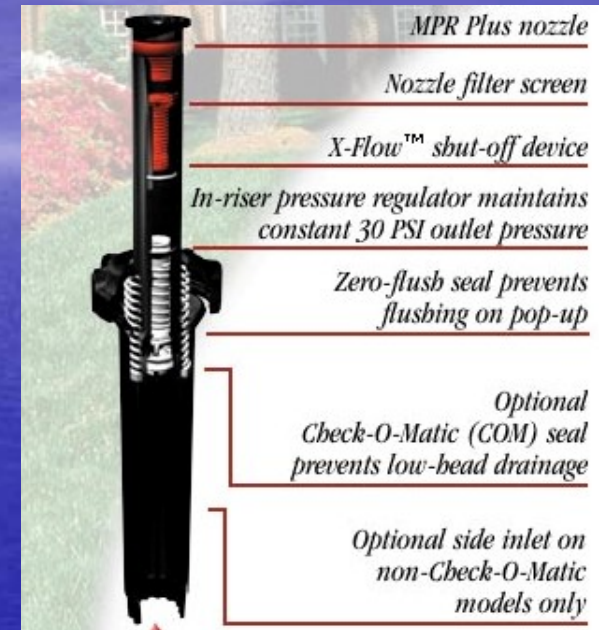
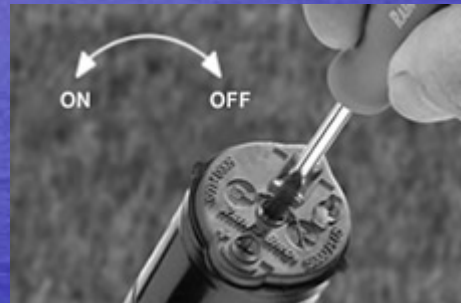
15/9 STRIP SERIES 30° SPRAY TRAJECTORY									
Nozzle	Pressure psi	Width ft	Flow gpm	Precip. in/hr					
ISEST	15	4 x 13	0.5	1.85					
		20	4 x 14	0.5	1.72				
		25	4 x 16	0.6	2.04				
ISST	15	4 x 26	0.9	1.67					
		20	4 x 28	1.0	1.72				
		25	4 x 28	1.1	1.89				
ISSST	15	4 x 26	0.9	1.67					
		20	4 x 28	1.0	1.72				
		25	4 x 28	1.1	1.89				
PSST	15	9 x 15	1.3	1.85					
		20	9 x 16	1.5	2.01				
		25	9 x 18	1.6	1.90				

METRIC 30° SPRAY TRAJECTORY									
Nozzle	Pressure psi	Length ft	Flow gpm	Precip. in/hr					
IS EST	1.4	1.2 x 4.3	0.11	41					
		1.7	1.2 x 4.3	0.14	54				
		2.3	1.2 x 4.6	0.14	51				
IS CST	1.4	1.2 x 7.9	0.20	42					
		1.7	1.2 x 8.5	0.23	45				
		2.3	1.2 x 9.1	0.27	50				
IS SST	1.8	1.2 x 7.9	0.20	42					
		1.7	1.2 x 8.5	0.23	45				
		2.3	1.2 x 9.1	0.27	50				
9 SST	1.8	2.3 x 4.4	0.30	42					
		1.4	2.3 x 4.8	0.34	51				
		1.7	2.3 x 5.5	0.36	49				

Sprinkler Advancements

- Additional sprinkler enhancements
 - Pressure regulation
 - Flow stop-auto and manual
 - Patterns for irregular shaped areas

Nozzle	Pressure (psi)	W x L (ft.)	Flow (GPM)
150Q	15	18 x 18	2.68
	20	19 x 19	3.06
	25	21 x 21	3.42
	30	23 x 23	3.73
15EST	15	4 x 13	0.45
	20	4 x 14	0.50
	25	4 x 14	0.56
	30	4 x 15	0.61
15CST	15	4 x 26	0.89
	20	4 x 28	1.00
	25	4x 28	1.11
	30	4 x 30	1.21
15RCS <small>NEW</small>	15	3 x 11	0.35
	20	3 x 12	0.40
	25	4 x 14	0.45
	30	4 x 15	0.49
15LCS <small>NEW</small>	15	3 x 11	0.35
	20	3 x 12	0.40
	25	4 x 14	0.45
	30	4 x 15	0.49



At 40 psi, the standard pressure fixed spray with a missing nozzle wastes water at a rate of 40 GPM.

That same fixed spray with an X-Flow feature wastes almost no water—99% less.

Valve Advancements

- Pressure regulation
- Battery actuation
- Wireless control
- Decoder Actuation



Pump Stations

- Pre-manufactured
- Skid mount
- Customized per application
- For main supply or booster
- VFD and Conventional
- Communication



Flow Measurement

- Water Meters
- Flow Meters
- Data Transfer/Monitoring



Sensors

- Rain
- Wind
- Moisture
- Temperature
- Flow
- Comprehensive weather



Control

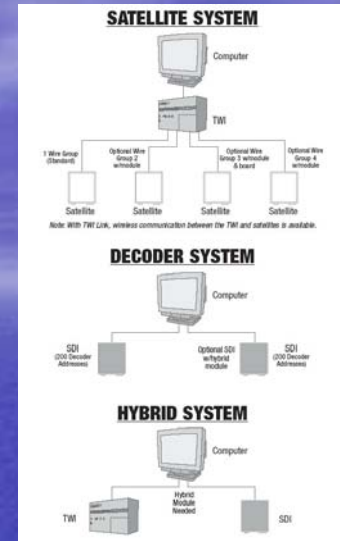
- ET-Climatic Data
- Sensory feedback
- Cycle and soak
- Solar/Battery
- Central control
 - Communication
 - Monitoring
 - Changes



Toro Intelli-Sense



Weather Reach Receiver



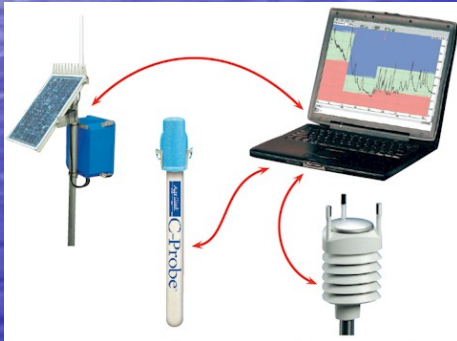
Field Transmitter and Accessories



Weathermatic SL Series



Irritrol Smart Dial



Aqua Conserve



The Cutting Edge

- Forecasting
- Membranes
- Expanded water re-use
- Installation methods
- Rainwater harvesting



Education is the Key

- Irrigation is rapidly advancing and requires continuous education
- We are being forced to produce the same results with less input
- The chemistry of water re-use requires special knowledge
- Efficiencies must increase as scrutiny increases
- Provisions must be made for ongoing management
- Installer qualifications are a huge factor in outcome



An Irrigation System Is Not An Appliance

- It is a systems integration process
- Knowledge of hydraulics, electricity, water resources, plants and soils are a must
- There is no substitute for experience
- Site visits are a must before, during and after construction
- *"When the water is cut off, the green industry closes it's doors."*-Ron Eberle, discussing 2002 Colorado drought.
- The people are more important than the products

U. S. EPA WaterSense

www.epa.gov/watersense



- Certification programs for irrigation professionals
 - Design
 - Installation
 - Auditing
- Labeling of irrigation products (coming soon)
 - Irrigation Controllers
 - Drip irrigation

Thanks!



green solutions
FOR A **blue planet**

ASLA Annual Meeting and EXPO
43rd IFLA World Congress
October 6-10, 2006
Minneapolis



AMERICAN
SOCIETY OF
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ARCHITECTS



See You in San Antonio.....



27th Annual International Irrigation Show
Henry B. Gonzalez Convention Center
San Antonio, Texas, USA
November 5-7, 2006
Education & Certification: November 2 - 7