

# Recommended Audit Guidelines

In order to create some degree of standardization of irrigation procedures in the irrigation industry, the IA has developed a set of minimum Guidelines. Consultation has occurred with many irrigation auditors, contractors, statisticians, educators and irrigation consultants. ASAE Standards have been reviewed and incorporated wherever possible. The following guidelines are meant to act as a set of guidelines only - **NOT** as a set of regulations or standards.

## **Irrigation Association: Irrigation Audit Guidelines**

The guidelines presented here were developed by the Irrigation Association (IA) and are intended to function as recommendations in the evaluation and performance of landscape irrigation systems. They have been designed to aid landscape professionals in fieldwork procedures and in irrigation performance calculations and techniques.

Recommendations and projections from the guidelines and their accuracy depend upon the quality of measurements and data provided by the individual user. The Irrigation Association makes no warranty, implied or expressed, as to the results obtained from these procedures.

### **Step #1**

- Pre-site inspection
- Irrigation system should meet all local codes
- System should be in working condition; all operational defects repaired

### **Step #2**

- Maximum wind allowable during audit = 5 mph or less (ASAE S398.1). Wind speed must be monitored and recorded every 5 minutes during audit.
- Audit must be conducted under normal operating conditions.
- Pressure tests must be conducted at normal operating conditions at the sprinkler using the appropriate pressure testing device at the beginning, middle and end of every zone audited.
- Catchments for a test area to be aligned on a grid layout. All catchments must be uniform in size and type.
- The catchments along the edge of the zones should be placed 12 to 24 in. in from the edge.
- Catchment spacing
  - For fixed spray sprinklers – near a head and half-way between the heads
  - For rotor heads, less than 40 ft radius – near a head and every 1/3 of the distance between the heads
  - Rotor heads, greater than 40 ft radius – near a head and every 1/4 of the distance between the heads
  - Unusual areas
    - Large areas, rotor sprinklers – uniform grid, 10 to 15 ft spacing (i.e., infield for baseball field)
    - Small areas, spray sprinklers – uniform grid, 5 to 8 ft spacing (i.e., narrow turf area less than 6 ft wide)
- Test running times must be consistent.
- When the test area contains multiple stations, the station run times must be adjusted to achieve a matched precipitation across the test area.
- Rotor sprinklers must run for a minimum five rotations during the test.
- All test results must be read in milliliters (mL) and it is recommended that a minimum of 25 mL of water be collected.
- The following data must be documented
  - Catchment locations
  - Catchment readings
  - Testing run times
  - Sprinkler locations

- Sprinkler spacing
- Pressure readings with locations
- Make, model, nozzle of sprinklers
- Soil types and root zone depths
- Wind speed readings
- Date and time to testing

### Step #3

- All calculations must be done using the following formula:

- $$DU_{LQ} = \left( \frac{\text{Average Catch in Lower Quarter}}{\text{Average Catch Overall}} \right) \times 100$$

$DU_{LQ}$  = distribution uniformity {%}.

- See attached work sheet.

- To calculate precipitation rate use the following formula:

- $$PR_{net} = \frac{3.66 \times V_{avg}}{t_R \times A_{CD}}$$

$PR_{net}$  = station precipitation rate {in./h},

$V_{avg}$  = average catch volume for station {mL},

$t_R$  = testing run time {min},

$A_{CD}$  = catch device throat area {in.<sup>2</sup>}.

- See attached work sheet.

- When calculating base schedule it is recommended to use IA scheduling methodology using the above calculated values ( $DU_{LQ}$ , PR), and procedures as presented in the Golf Irrigation Auditor and Landscape Irrigation Auditor manuals.
- A program to calculate the  $DU_{LQ}$ , precipitation rate, and generic audit forms are available at [www.irrigation.org](http://www.irrigation.org)

The following calculation sheet for Distribution Uniformity (DU) and Precipitation Rate (PR) is a generic sheet that is recommended to calculate the required values.

# DU and PR Calculations

Catchment Type: \_\_\_\_\_ Catchment Device Area ( $A_{CD}$ ): \_\_\_\_\_ sq. in.

Can #1 _____	#13 _____	#25 _____	#37 _____	#49 _____	#61 _____
Can #2 _____	#14 _____	#26 _____	#38 _____	#50 _____	#62 _____
Can #3 _____	#15 _____	#27 _____	#39 _____	#51 _____	#63 _____
Can #4 _____	#16 _____	#28 _____	#40 _____	#52 _____	#64 _____
Can #5 _____	#17 _____	#29 _____	#41 _____	#53 _____	#65 _____
Can #6 _____	#18 _____	#30 _____	#42 _____	#54 _____	#66 _____
Can #7 _____	#19 _____	#31 _____	#43 _____	#55 _____	#67 _____
Can #8 _____	#20 _____	#32 _____	#44 _____	#56 _____	#68 _____
Can #9 _____	#21 _____	#33 _____	#45 _____	#57 _____	#69 _____
Can #10 _____	#22 _____	#34 _____	#46 _____	#58 _____	#70 _____
Can #11 _____	#23 _____	#35 _____	#47 _____	#59 _____	#71 _____
Can #12 _____	#24 _____	#36 _____	#48 _____	#60 _____	#72 _____

Subtotals \_\_\_\_\_

RUN TIME ( $t_R$ ): \_\_\_\_\_ TOTAL CATCH: \_\_\_\_\_ mL

## Calculating Distribution Uniformity (DU)

$$\begin{aligned}
 DU_{LQ} &= \left( \frac{\text{Average Catch in Lower Quarter}}{\text{Average Catch Overall}} \right) \times 100 \\
 &= \left( \frac{\text{_____ mL}}{\text{_____ mL}} \right) \times 100 \\
 &= \text{_____ \%}
 \end{aligned}$$

**DISTRIBUTION UNIFORMITY (DU): \_\_\_\_\_ %**

## Calculating Precipitation Rate (PR)

$$PR_{\text{net}} = \frac{3.66 \times V_{\text{avg}}}{t_{\text{R}} \times A_{\text{CD}}}$$

$$= \frac{3.66 \times (\text{___ mL})}{(\text{___ min}) \times (\text{___ in.}^2)}$$

$$= \text{___ in./h}$$

**PRECIPITATION RATE (PR) \_\_\_\_\_ in. / h**