



**Distribution Uniformity - Chemigation**

**Uniform Coverage**

Uniform Coverage is an assessment of an irrigation system's nozzling package concerning the spatial distribution of water on the application site. To evaluate the application uniformity (uniformity coefficient) over the area irrigated, the radial and, with center pivots, circular application uniformity must be determined. These calculations are normally done using catch-can data collected from a cross-section of the application site.

In a chemigation application, uniform coverage relates to the application of irrigation water containing pesticide or fertilizer products. An irrigation system designed and maintained at a satisfactory uniformity coefficient allows for the uniform application of pesticides or fertilizers. Systems with intermittent operation of endguns or swing spans (corner catchers) are the exception. These systems can vary by as much as 25 percent, or more, unless equipped with a variable rate injection system that compensates for water flow variations caused by the sequencing of nozzle operation (on the swing span) and of the endgun.

Circular Uniformity ( $CU_c$ ) is a measure of the application uniformity along concentric circular paths under a center pivot lateral at constant radial distances from the pivot point.  $CU_c$  provides information on how nozzle discharge varies with lateral position. However, it does not indicate how well the nozzle package along the entire lateral was designed or how well the nozzle package as a whole was maintained, since only one radius is sampled.

Radical application uniformity ( $CU_r$ ) is a better measure of nozzle package performance. It measures the uniformity perpendicular to the circular or linear paths traveled by the sprinklers on the lateral.  $CU_r$  values are used to assess self-propelled irrigation systems for distribution uniformity that are consistent with guidelines as issued by the International Irrigation Association.

**Distribution Uniformity**

Distribution Uniformity measures the uniformity of irrigation water over an area, which is customarily reported as Distribution Uniformity of lower quarter, or  $DU_{lq}$ .  $DU_{lq}$  is the ratio of the average of the lowest one-fourth of measurements of

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irrigation water applied to the average depth of the total irrigation water applied (ASAE Standard S526.2, R2006).

Distribution Uniformity is determined through a field procedure utilizing “catch can” tests, which measures the water actually being applied. The industry recognized standard for characterizing the uniformity of water distribution is ANSI/ASAE Standard S436.1 (R2007). It computes the coefficient of uniformity of sprinkler packages installed on center pivots and lateral move irrigation machines. The ASAE standard is an accepted national standard by the American National Standards Institute (ANSI). For well-designed irrigation systems, the  $DU_{1q}$  ranges from 93 to 96 percent with systems outfitted with impact sprinklers and, with spray nozzles, from 91 to 95 percent.

**National Standard for  
Distribution Uniformity**

[USDA-NRCS Conservation Practice Standard, Code 442: Irrigation System – Sprinkler](#) is a nationally recognized reference for sprinkler discharge systems.

As established in USDA-NRCS Code 442, the pivot system (Heermann-Hein) or linear system (Christensen) Coefficient of Uniformity (CU) shall not be less than 85% (76% Distribution Uniformity [DU]). It is recommended, prior to the application of a product through an irrigation system, that the CU (or DU) of the system should be determined and, if necessary, corrective measures undertaken to conform the system to the performance standard.

USDA-NRCS Code 442 is the established industry standard in determining distribution uniformity. ANSI/ASAE Standard S436.1 (R2007) is the established industry standard that describes the procedure for determining the uniformity of water distribution for center pivot and linear move irrigation machines equipped with sprayheads or with impact sprinkler nozzles.