WEQ RANDOM ROUGHNESS GUIDELINES

Random roughness is the nonoriented surface roughness that is sometimes referred to as cloddiness. Such roughness is usually created by the action of tillage implements. Random roughness is described as the standard deviation of elevation from a plane across a tilled area, after oriented roughness has been accounted for.

The WEQ "Krr" factor for Random Roughness has been developed for various levels of I-value and surface random roughness (See graph on page 3). Random roughness values are represented as *standard deviation* of roughness heights. The Random Roughness values used in WEQ are the same Random Roughness values used in RUSLE.

Random roughness (inches) from the machine operations database in RUSLE can be used to determine WEQ random roughness values (See table on page 2). However, keep in mind that these RUSLE random roughness values were determined for medium textured soils tilled at optimum moisture conditions for creating random roughness. Under most circumstances random roughness should be determined by comparing a field surface to the random roughness (standard deviation) photos in the RUSLE handbook (See Agriculture Handbook Number 703, Appendix C).[1]

When both random roughness and ridge roughness are present in the field, they are complimentary. Random roughness, particularly in the furrows, reduces wind erosion which occurs along wind directions parallel to the ridges.

When both are present, the K-factors for ridges and random roughness will be multiplied together to obtain the total roughness K-factor. At this time a total roughness K-factor of 0.5 will be the lowest value allowed for computing wind erosion. The random roughness factor will only be used with the WEQ Management Period Method.

The major effects of random roughness on wind erosion are to raise the threshold wind speed at which erosion begins and to provide some sheltered area among the clods where moving soil can be trapped. Hence, when the effectiveness of random roughness increases the K-value decreases.

Random roughness is subject to much faster degradation by rain or wind erosion than large tillage ridges. Therefore the WEQ management period, where random roughness is effective, may be of short duration.

[1] The photos in Appendix C are on the Fort Collins server at the following address:
ftp.nrcs.usda.gov/divisions/esd/erosion
State Agronomists can reproduce and distribute the photographs to Field Offices.

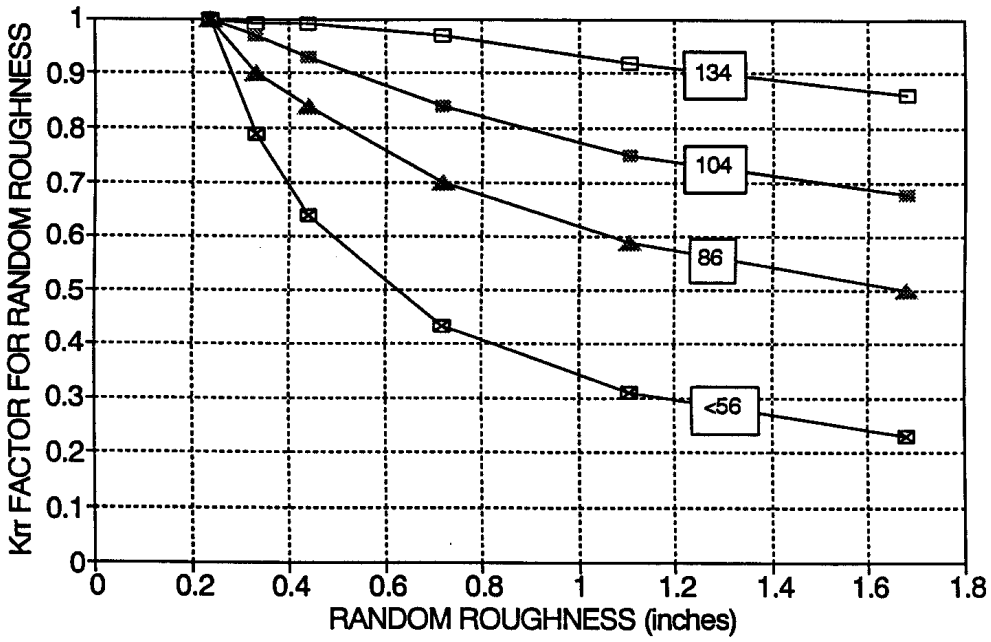
Parameter values of "core" cropland field operations[1]. From the RUSLE Handbook.

These values may be used in WEQ for Random Roughness. However the use the Random Roughness photos in the RUSLE handbook may be preferable, especially where roughness is due to residual sod material such as the crowns of plants with its attached roots and soil.

FIELD OPERATIONS	RANDOM ROUGHNESS (inches)
Chisel, sweeps	1.20
Chisel, straight point	1.50
Chisel, twisted shovels	1.90
Cultivator, field	0.70
Cultivator, row	0.70
Cultivator, ridge till	0.70
Disk, 1-way	1.20
Disk, heavy plowing	1.90
Disk, tandem	0.80
Drill, double disk	0.40
Drill, deep furrow	0.50
Drill, no-till	0.40
Drill, no-till into sod	0.30
Fertilizer applicator, anhyd knife	0.60
Harrow, spike	0.40
Harrow, tine	0.40
Lister	0.80
Manure injector	1.50
Moldboard plow	1.90
Mulch treader	0.40
Planter, no-till	0.40
Planter, row	0.40
Rodweeder	0.40
Rotary hoe	0.40
Vee ripper	1.20

[1]These values are typical and representative for operations in medium textured soils tilled at optimum moisture conditions. Many of the machines may differ by cropping region, farming practice, soil texture, or other conditions. Refer to the random roughness photos in the RUSLE handbook and adjust to values that seem most appropriate.

Graph to convert random roughness heights (standard deviation in inches) to WEQ K-subfactors for random roughness



Random rouhghness is defined as the standard deviation of roughness heights in inches.

I = 134 I = 104 I = 86 I < or = 56