

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

SURFACE ROUGHENING

(Acre)

CODE 609

DEFINITION

Performing tillage operations that create random roughness (RR) of the soil surface.

PURPOSES

- Reduce wind erosion
- Reduce dust emissions into the air
- Reduce deposition of soil into surface water
- Protect plants from abrasion by windblown particles

CONDITIONS WHERE PRACTICE APPLIES

On soils that have a surface layer suitable for clod formation and have a high potential for wind erosion due to lack of surface cover. This practice should not be used as a primary erosion control practice.

This practice applies on soils whose surface layer has a wind erodibility factor (I) value of 104 or less. The 104 I is an irrigated value developed to account for the decreased erodibility of a 134 I value soil. See National Agronomy Manual (NAM), Exhibit 502-2.

This practice applies when a well-planned and properly applied wind erosion control system fails for reasons beyond the control of the producer. These situations may exist when a low residue-producing crop fails to produce sufficient residue cover or when the planned erosion control system fails to control erosion during a high wind event.

CRITERIA

General Criteria

Tillage operations done for this purpose will produce RR values (inches) large enough to

achieve a 25 percent reduction in the potential erosion rate (soil "I" value), **OR** reduce wind erosion during the management period by 25 percent as determined by the most current wind erosion technology.

The RR (K_{rr}) value used to estimate wind erosion shall be determined from Table 1. The RR (K_{rr}) **shall be equal to or less than 0.75**.

The shaded area shows the RR – "I" factor combinations that meet the 25 percent reduction criterion.

Table 1. K_{rr} from RR and "I" Factor Values¹

RR (in)	I = 104	I = 86	I ≤ 56
0.2"	1.0	1.0	1.0
0.4"	0.95	0.86	0.70
0.6"	0.88	0.76	0.51
0.8"	0.82	0.68	0.40
1.0"	0.78	0.62	0.34
1.2"	0.74	0.57	0.30
1.4"	0.72	0.54	0.27
1.6"	0.69	0.51	0.24

¹Note-I factor values >134 have a $K_{rr} = 1.0$, and the I of 134 soil will not reach a 25 percent reduction at any RR.

The RR values shall be estimated from the field operation table for RR (see the NAM, Part 502, Exhibit 502-7), or estimated using the roughness pictures in Agriculture Handbook 703, Appendix C, pages 339 to 347.

Surface roughening will comply with all federal, state, and local laws and regulations.

Additional Criteria to Control Wind Erosion

When the planned wind erosion control system fails, emergency tillage (surface roughening) can be done on soil that has an "I" factor greater

than 104 using deep tillage when soil moisture is adequate to create a stable aggregate (clod) and when finer soil material can be brought to the surface.

Perform the initial tillage operation as soon as erosion starts or as soon as it is evident that the existing cover or surface roughness is inadequate to control erosion below an acceptable level.

Begin surface roughening operations on the windward (up wind) edge of the field.

Additional Criteria to Protect Plants from Abrasion by Wind Blown Soil Particles

Surface crusts generally reduce soil erodibility. However, certain smooth, crusted soils with loose grains (sand size particles) on the soil surface may cause crusts to abrade rapidly. These soils include loamy fine sands and sandy loams that have significant portions of sand on the surface when crusted. They also include certain calcareous loams, silt loams, and silty clay loams that tend to form sand-sized aggregates in the surface when crusted.

Tillage operations for this purpose will produce RR sufficient to reduce or eliminate surface creep (roller phase) and saltation during crop emergence and early crop development. The RR created will temporarily reduce the abrasion of sensitive crops. Rotary hoes, sand fighters, or similar implements can create this roughness.

CONSIDERATIONS

Ridging associated with the tillage is very important to controlling wind erosion. Tillage that creates ridging will be done perpendicular to the direction of damaging wind.

Wide spacing of chisel points or skip-chiseling (alternate chiseled/non-chiseled strips) for the first operation may permit salvaging part of a growing crop of small grain and leave undisturbed soil for later operations, if needed.

Spacing and depth of chisel operation are important to obtain uniform distribution of clods on the surface. Close spacing at shallow depths generally pulverizes the soil and does not produce enough RR to decrease the soil-blowing potential.

Proper tillage equipment matched to the crop being grown and soil is important. In general, chisels or narrow sweeps may reduce potential soil blowing on loamy or fine-textured soils. Roughening the soil surface with a lister/bedder or wide shovels on chisel shanks is more effective on coarse textured soils.

PLANS AND SPECIFICATIONS

Plans and specifications for establishment of this practice shall be prepared for each field or treatment unit according to the conditions and criteria in this standard. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

This practice will be performed as soon as possible when there is inadequate cover to protect the soil from potential wind erosion events or when a crusted soil condition occurs as sensitive crop is emerging and inadequate crop residues are present.