



Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

CONTOUR FARMING

CODE 330

(ac)

DEFINITION

Aligning ridges, furrows, and roughness formed by tillage, planting and other operations to reduce velocity and direction of water flow to around the hillslope.

PURPOSE

This practice may be applied to achieve one or more of the following:

- Reduce sheet and rill erosion - Resource Concern (SOIL EROSION – Sheet, rill, & wind erosion).
- Reduce transport of sediment, other solids, and the contaminants attached to them - Resource Concern (SOIL EROSION – Sheet, rill, & wind erosion).
- Reduce transport of contaminants found in solution runoff - Resource Concern (WATER QUALITY DEGRADATION – Excess nutrients in surface and ground waters; Pesticides transported to surface and ground waters; Excess pathogens and chemicals from manure, bio-solids or compost applications).
- Increase water infiltration – Resource Concern (INSUFFICIENT WATER - Inefficient Moisture Management).

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on sloping land where annual crops are grown. The practice is best suited for sites with uniform slopes between 2 and 10 percent.

Several factors influence the effectiveness of [contour](#)¹ farming to reduce soil erosion. These factors include:

- [ridge height](#);
- [row grade](#);
- cover and roughness;
- [slope length](#) and steepness; and
- soil infiltration rate

CRITERIA

General Criteria Applicable to All Purposes

The following criteria apply to purpose.

1. Minimum Row Grade:
 - Soils with very slow infiltration rates (hydrologic groups C and D) will have a minimum absolute row grade of 0.2 percent on slopes where ponding could be a problem.

- The crop rows shall have sufficient grade to ensure that runoff water does not pond and cause unacceptable crop damage.
- The row grade shall be aligned as closely as possible to the contour to achieve the greatest erosion reduction possible.

2. Maximum Row Grade

- The maximum row grade shall not exceed 4 percent.
- The maximum row grade shall not exceed one half of the up and down hill slope percent used for erosion prediction, or 4 percent, whichever is less.
- Up to 25 percent deviation from the design row grade is permissible within 150 feet of a stable outlet.
- When the row grade exceeds the maximum allowable design grade, a new baseline shall be established up or down slope from the last contour line and used for layout of the next contour pattern.

3. Minimum Ridge Height

- Ridge height criteria is not required if residue levels are 50 percent or greater after planting.
- Row spacing greater than 10 inches with residue below 50 percent require:
The minimum ridge height of 2 inches during the period of the rotation that is most vulnerable to sheet and rill erosion which is before crop canopy.
- Row spacing 10 inches or less.
The minimum ridge height shall be one inch for close-grown crops such as small grains.

4. Maximum Slope Length

Slope length starts at the point where downslope flow begins and ends where deposition or concentrated flow channels begin. Varying slope lengths and slope steepness may result in a number of different contour farming baseline patterns on a hillside. Contour farming layout shall not occur on a hill slope length that is longer than the maximum slope length identified in [Table 1](#) unless:

- additional supporting practices are applied (WI NRCS Conservation Practice Standard ([WI NRCS CPS](#)), Terrace (Code 600); Diversion (Code 362); Stripcropping (Code 585); Contour Buffer Strips (Code 332)) or ;
- a certified conservation planner or an individual with planning job approval for the practices identified in 3.a. (above), documents in the case file that additional practices are not needed based on a well-defined in-field evaluation of the site conditions.

Land Slope Percent	Maximum Length ¹ (feet)
1 to 2	400
3 to 5	300
6 to 8	200
9 to 12	120
13 to 16	80
17 to 20	60
21 to 25	50
¹ Limit may be increased by 25 percent if residue cover after crop plantings will regularly exceed 50 percent.	

5. Stable Outlets

Surface water flow from contoured fields must be delivered to a stable outlet.

Additional Criteria to Increase Water Infiltration

1. Row Grade

Where increased water infiltration is a conservation planning objective, the maximum row grade shall not exceed 0.2 percent.

CONSIDERATIONS

1. Consider the impact of alternative tillage practices that change ridge height to provide more runoff velocity reduction.
2. Consider increasing residue cover and roughness to change the vegetative covermanagement conditions and decrease overland flow velocities.
3. Prior to design and layout, obstruction removal and changes in field boundaries or shape should be considered, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.
4. Where contour row curvature becomes too sharp to keep machinery aligned with rows during field operations, consider establishment of sod turn strips on sharp ridge points or other odd areas as needed. Maintain adequate vegetative cover on sod turn strips, field borders, or other non-cropped critical areas to adequately control erosion.
5. When the intersection of crop rows with the field edge is not perpendicular, WI NRCS CPS, Field Border (Code 386), may be needed to allow farm implements room to turn.
6. The width of correction areas, and the distance between baselines, should be adjusted based on the operation widths of the current farm equipment.
7. If using WI NRCS CPS, Residue and Tillage Management, Reduced Till (Code 345) on the contour, avoid crossing over ridged rows at correction areas because this will destroy the effectiveness of the ridges. Sod turn strips maybe established if correction areas are unavoidable.
8. Ridge height is created by the operation of tillage and planting equipment. The greater the ridge height, the more effective the operation is in slowing overland flow. The RUSLE2 operations database contains the ridge height value for each field operation.
9. Consider the use of diversions, grassed waterways, water and sediment control basins, underground outlets, or other suitable practices to protect areas of existing or potential ephemeral or concentrated flow erosion.
10. Consider permanently sodded end rows WI NRCS CPS, Field Boarder (Code 386), for additional erosion protection.
11. This practice is not well suited to rolling topography having a high degree of slope irregularity because of the difficulty meeting row grade criteria. The closer the row grade is to true contour, the greater the erosion reduction. When contour is within the 330 CPS specifications it is considered "absolute row grade" in RUSLE2. "Relative Row Grade" accounts for the row grade that is exceeds WI NRCS CPS 330 and is considered cross slope farming.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field according to the Criteria, Operation and Maintenance described in this standard. The plans shall include:

- percent slope and slope length used for conservation planning for each contour system
- the minimum and maximum allowable row grades for the contour system (documentation used to make that decision)
- a sketch (plan map) and photograph of the field showing:
 - the approximate location of the keyline(s) used to establish the system,
 - the location of stable outlets, and
 - the location of all planned or existing supporting conservation practices needed to control

surface water runoff.

OPERATION AND MAINTENANCE

Perform all tillage and planting operations parallel to contour baselines or terraces, diversions, or contour buffer strip boundaries where these practices are used, provided the applicable row grade criteria are met.

Where terraces, diversions, or contour buffer strips are not present, maintain contour markers on grades that, when followed during establishment of each crop, will maintain crop rows at designed grades. Contour markers may be field boundaries, a crop row left untilled near or on an original contour baseline, or other readily identifiable, continuous, lasting marker. All tillage and planting operations shall be parallel to the established marker.

If a marker is lost, re-establish a contour baseline within the applicable criteria set forth by this standard prior to seedbed preparation for the next crop.

Farming operations should begin on the contour baselines and proceed both up and down the slope in a parallel pattern until patterns meet. Where contour row curvature becomes too sharp to keep machinery aligned with rows during field operations, establish sod turn strips on sharp ridge points or other odd areas as needed. Corrective strips where baselines are re-established should be left in permanent sod as well.

REFERENCES

USDA, NRCS, Revised Universal Soil Loss Equation Version 2 (RUSLE2) Wisconsin web site:
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/wi/technical/cp/?cid=nrcs142p2_020801

Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators. 1997. Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook 703.

DEFINITIONS

Contour (III) – A line or tillage pattern established generally perpendicular to the field slope.

Keyline (IV.A.1.): A keyline is defined as the initial baseline used for the establishment of a contour farming layout. The keyline is typically laid out on the most uniform area of the hillside slope segment to be protected. The lower third of the slope segment is generally the most uniform landform. The keyline must be established to meet the minimum and maximum row grades required by the criteria. When it is not possible to maintain the required row grades on the keyline or upslope areas, establish a new baseline.

Baseline: Baseline is used to define the adjusted contour line when maximum row grade is exceeded. This is sometimes referred to as the keyline although keyline is the start line of a contour system.

Row grade: A measurement of the percent grade when looking down a crop row. The row grade is a measurement of how far the row itself is from perpendicular to a hillside. Zero percent row grade would be completely perpendicular to the slope of the hillside.

Ridge height: Surface condition during ¼ of the year when rainfall and runoff are most erosive and soil is most susceptible to erosion. Very Low Ridge Height is defined as 2 inches or less where fields are rolled, pressed or dragged after planting conventionally drilled crops. RUSLE2 operations data base contains the ridge height value for each field operation.

Slope length: The point where downslope flow begins to occur and ends where soil deposition occurs or flow concentrates into an ephemeral gully.