

# **IGGA Guide Specification: NGCS Construction on Existing or Newly Constructed Roadways**

## **INTRODUCTION**

This standard developed by the International Grooving and Grinding Association (IGGA) specifies the procedures for project level construction of the Next Generation Concrete Surface (NGCS) on existing or newly constructed roadways using diamond grinding and grooving techniques. This standard does not apply to any other diamond grinding or grooving processes and should not be used for construction of NGCS test sections. Also found within this standard are guidelines for levels of acceptance related to the desired surface characteristics. The user of this standard shall be responsible to ensure that all local safety, health and environmental standards are made a part of the specifications.

For existing roadways that exhibit more than ¼ inch of faulting or surface irregularities it may be necessary to pre-grind the surface using conventional diamond grinding to restore the roadway template prior to construction of the NGCS surface.

NGCS is a term used to describe a category of texture(s) that have or will evolve through current research. The term may apply to several textures that evolve for both new construction and rehabilitation of existing surfaces. When constructed properly, these textures will provide a very smooth profile coupled with good micro texture and excellent macro texture. This specification provides direction for construction of the technique.

The user of this standard accepts ALL responsibility for decisions made as a result of its use. The International Grooving and Grinding Association, its Officers, Board of Directors and staff are absolved of any responsibility for any decisions made as a result of your use. Use of this standard implies acceptance of the terms of use.

## **Guide Specification: NGCS Construction on Existing or Newly Constructed Roadways**

**Publication Date: 5-19-20**

### **SCOPE**

This standard specifies the procedures for project level construction of the Next Generation Concrete Surface (NGCS) on existing or newly constructed roadways using diamond grinding and grooving techniques. This standard does not apply to any other diamond grinding or grooving processes and should not be used for construction of NGCS test sections. Also found within this standard are guidelines for levels of acceptance related to the desired surface characteristics. The user of this standard shall be responsible to ensure that all local safety, health and environmental standards are made a part of the specifications.

### **EQUIPMENT**

Grinding shall be accomplished using diamond blades mounted on a self-propelled machine designed specifically for diamond grinding and texturing pavement. The equipment shall weigh a minimum of 35,000 pounds including the grinding head and be of a size that will grind a strip at least 4 feet wide in a single pass. The effective wheel base of the machine shall be no less than 12 feet. The effective wheel base is defined as the distance from the front wheel assembly transverse pivot point to the transverse pivot point of the profile/depth control/ ground drive wheels.

Grinding equipment that causes raveling, aggregate fractures, spalls, or disturbance to the transverse or longitudinal joints shall not be permitted. The equipment shall have a positive means of vacuuming the grinding residue from the pavement surface leaving the surface in a clean, near-dry condition.

The equipment shall be maintained to ensure it is in proper working order, with attention paid to the “roundness” of the match and depth control wheels. Any wheels found to be out of round shall be replaced immediately.

### **CONSTRUCTION**

The construction operation shall be scheduled and proceed in a manner that produces a neat, uniform finished surface. Shoulder, auxiliary or ramp lane grinding shall transition from the edge of the mainline as required to provide drainage, leaving no more than a 3/16 inch ridge and an acceptable riding surface. When conditions require a feather pass into the shoulder, auxiliary or ramp lanes, conventional diamond grinding shall be used. Full- and partial-depth concrete repairs, slab stabilization and dowel bar retrofit shall be completed prior to any grinding. Joint sealing shall be completed subsequent to the diamond grinding operations and shall be installed in a recessed condition.

NGCS construction can be accomplished as a single-pass or two-pass operation as determined by the contractor. If the single pass operation is selected, smoothness levels stated within this

standard must be attained and checked periodically by the contractor throughout the construction phase to ensure that corrective measures are not necessary as this could impact the quality of the NGCS texture.

Grinding shall be accomplished in a manner that eliminates joint or crack faults so there is no more than a 1/16 inch differential between the adjacent sides of the joints and cracks. Grinding shall also substantially remove pavement conditions such as warp and curl to provide an acceptable ride.

Lateral drainage shall be achieved by maintaining a constant cross slope between grinding extremities in each lane. The finished cross slope shall mirror the pre-grind cross slope and shall have no depressions or misalignment of slope greater than 1/8 inch in 12 feet when measured with a 12 foot straightedge placed perpendicular to the centerline. Straightedge requirements will not apply across longitudinal joints or outside the ground area.

Grinding shall begin and end at lines normal to the pavement centerline at the project limits. Passes of the grinding head shall not overlap more than 1-2 inches. No unground surface area between passes will be permitted.

**Single-Pass NGCS Operation** – The construction operation will provide a flush ground surface that contains longitudinal grooves and shall be constructed in one, single-pass operation. The diamond blade stack will consist of two types of diamond grinding blades arranged to provide a flush ground surface as well as those required to produce the longitudinal grooves. The flush grind diamond blades shall be mounted on a minimum 4 foot grinding head, stacked with 0.125 inch wide blades separated by 0.035 +/- 0.005 inch wide spacers resulting in 92 to 100 blades per foot. The blades used to produce the flush ground surface shall be flat across their contact surface and in the same plane with other flush grind blades (excluding grooving blades) when mounted. The complete head, when stacked with all blades, shall be straight across its length without bowing when mounted on the diamond grinding machine. No unground surface area between passes will be permitted. The longitudinal grooving blades shall be 0.095 +/- 0.005 inches wide and spaced among the flush grind blade stack on 1/2 inch to 5/8 inch centers. The grooving blades shall produce grooves 1/8 inch to 3/16 inch in depth. The grooves shall be constructed parallel to the centerline. The contractor shall use a guide to ensure proper alignment of the grooves to centerline.

**Two-Pass NGCS Operation** – This construction operation will allow for two separate operations to construct the NGCS section. The first operation will create the flush ground surface. The flush grind blades shall be mounted on a minimum 4 foot grinding head, stacked with 0.125 inch wide blades separated by 0.035 +/- 0.005 inch wide spacers resulting in 92 to 100 blades per foot. The blades used to produce the flush ground surface shall be flat across their contact surface and in the same plane with other flush grind blades when mounted. The complete head, when stacked with all blades, shall be straight across its length without bowing when mounted on the diamond grinding machine. No unground surface area between passes will be permitted. The smoothness levels stated within this standard must be attained and measured to the satisfaction of the Engineer prior to constructing the second operation. The second operation will provide the longitudinal grooves. The longitudinal grooving blades shall be 0.095 +/- 0.005 inches wide and will

produce grooves 1/8 inch to 3/16 inch in depth. The longitudinal grooves will be spaced on 1/2 inch to 5/8 inch centers. The grooves shall be constructed parallel to the centerline. The contractor shall use a guide to ensure proper alignment of the grooves to centerline.

### **FINAL SURFACE FINISH**

The NGCS grinding process shall produce a pavement surface that is true to grade and uniform in appearance with a longitudinal grooved texture. The flush ground surface shall appear smooth and shall contain no ridges that exceed 1/32 inch. The longitudinal grooves shall be constructed parallel to the centerline. At a minimum, 98% of the pavement surface shall be textured utilizing the NGCS. Depressed pavement areas due to subsidence, edge slump or other localized causes will be excluded from this requirement when approved by the Engineer.

The final surface will look similar to the photo in Appendix A.

### **SLURRY HANDLING AND REMOVAL**

Slurry shall be collected, processed and disposed off in accordance with the IGGA Diamond Grinding Slurry Handling--Best Management Practices-April 2013. This document is available on the web at [www.igga.net](http://www.igga.net).

### **SMOOTHNESS REQUIREMENTS**

Each segment of the finished NGCS shall have a final profile with a Mean International Roughness Index (MRI) of 50 inches/mile or less.

The smoothness profile shall be generated using profiler equipment with a laser that simulates the tire footprint. Single point lasers shall not be used. Line laser equipment such as RoLine™, Gocator™, or an approved equal shall be used. All equipment shall have current certification and be approved by the Engineer. It is recommended that the current version of the following AASHTO specifications be used for equipment procurement, calibration and use, and measurement protocols: M 328; R 54; R 56; R 57.

The finished ground surface shall have a localized roughness (IRI) less than or equal to 125 inches per mile, when determined using the ProVAL Assurance Module with a 25 ft baseline.

### **METHOD OF MEASUREMENT**

NGCS construction will be measured by the square yard. The measurement will be the final textured surface area regardless of the number of passes required to achieve acceptable results.

Minor areas of unground pavement within the designated areas to be ground will be included in the measurement. When conditions require a feather pass into the shoulder, auxiliary or ramp lanes, conventional diamond grinding shall be used. Payment will be by the square yard based on a width of 2 feet times the length of the required feather pass. The minimum length of feather pass will be 100 feet.

### **BASIS OF PAYMENT**

NGCS construction will be paid for at the contract price per square yard. Payment shall be full compensation for all labor, equipment, material, and incidentals to complete this work, including hauling and disposal of grinding residue. Table 1 indicates recommended price adjustments.

**TABLE 1 RECOMMENDED PRICE ADJUSTMENTS**

<b>Speeds <math>\geq</math> 45 MPH</b>	
<b>MRI (in./mi.)</b>	<b>\$/sq. yd.</b>
<b>0-34</b>	<b>\$1.13</b>
<b>35-44</b>	<b><math>(45 - \text{MRI}) * 0.1125</math></b>
<b>45-50</b>	<b>0</b>

## Appendix 1 Photo of NGCS

