

IGGA Guide Specification: NGCS Test Section Construction on New and Existing Roadways

INTRODUCTION

This standard developed by the International Grooving and Grinding Association (IGGA) specifies the procedures for test section construction of the Next Generation Concrete Surface (NGCS) on newly constructed or existing roadways using diamond grinding and grooving techniques. This test section will aid the industry in developing a new standard for quiet concrete pavement and to that end this specification includes additional controls and safeguards to ensure proper construction. This standard does not apply to any other diamond grinding or grooving processes and should not be used for construction of project level NGCS. 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

NGCS Test Section Location Selection Guidelines

Objective

These guidelines were developed to assist in selecting locations for and constructing Next Generation Concrete Surface (NGCS) test sections. When constructing NGCS test sections, the following items should be considered:

Length of Test Section

A minimum length of 1000 feet with a preferred length of 1500 to 2500 feet is desired. The full lane width should be ground.

Roadway Geometry of Test Section

It is desirable to construct the sections on level, tangent sections with good sight distance where possible. Adequate distance before and after the test section is necessary to conduct field testing.

Evaluation of Test Section

NGCS test sections are generally constructed to conduct noise and friction evaluations. As such it is important to consider how the future evaluations can be conducted at the proposed test section. Test sections should not be located near stop signs, traffic signals, intersections, etc.

Speed

Noise testing is conducted at 60 MPH and friction testing at 40 mph. Noise testing is conducted with a passenger car and it takes approximately 1/4 mile in distance to get to 60 mph and set the cruise control. Upon completion of the noise testing it will take approximately 1000 feet after the test section to stop. Locations with posted speed limits in the range of 50 to 70 mph are preferred.

Wheelpath

Noise testing and sometimes friction testing are conducted in the right wheelpath. This is the most important texture to construct. Feathering of the test grind should not occur at this location.

Shoulders

Although not a requirement, it is highly desirable to have paved shoulders where possible. This facilitates testing and provides a location to take photographs.

NGCS and CDG Test Sections

Whenever possible, it is desirable to construct both a conventional diamond ground (CDG) test section and an NGCS test section together. It is best to construct them in the same lane at the same location to assure similar traffic. If the textures must be constructed in adjacent lanes, it is desirable to have them begin and end at the same location. Both textures are constructed to facilitate comparisons between the two surface types.

Transverse Joint Opening Width

Transverse joint opening widths do impact overall tire-pavement noise levels. The impact increases as the joint gets wider and deeper. A wide joint that is 0.5 inch wide and 1 inch deep can add between 1 and 1.5 dBA to the noise level of a quiet pavement. Whenever possible, narrow sealed joints should be selected. If the existing pavement has wide joints, the joints should be sealed.

Overbanded sealant should not be allowed as this contributes to both increased roughness and noise levels.

Existing Texture

Since the purpose of the test section is to evaluate the CDG and NGCS textures, it is important to completely remove the existing pavement texture from the test section so that it will not influence the final results.

Pavement Life

It is anticipated that field reviews will occur for a period of 5 to 10 years. Therefore, it is desirable that the roadway surface not be altered during the evaluation period such as with an overlay or additional grinding/slab repair, etc. Only pavements in good condition should be used.

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SCOPE

This standard specifies the procedures for test section construction of the Next Generation Concrete Surface (NGCS) on newly constructed and existing roadways using diamond grinding and grooving techniques. This test section will aid the industry in developing a new standard for quiet concrete pavement and to that end; this specification includes additional controls and safeguards to ensure proper construction. This standard does not apply to any other diamond grinding or grooving processes and should not be used for construction of project level NGCS. 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.

The grooving equipment will consist of commercially manufactured devices designed specifically for highway or airport diamond grooving/grinding operations. The equipment will be produce grooves which are parallel to the roadway centerline.

CONSTRUCTION

This standard assumes that a newly constructed texture will consist of a simple drag texture and that a tined texture has not been constructed. If a tined texture has been constructed as part of the original construction on a new or existing pavement, this texture shall be removed using conventional diamond grinding techniques or during the NGCS procedure at the contractor's option.

Similarly if an existing roadway exhibits greater than ¼ inch faulting or surface deviations, it may be necessary to pre-grind the surface using conventional diamond grinding techniques (e.g. 0.125 inch blades and 0.110 inch spacers). Any pre-grinding or texture removal must remove 100% of the existing surface texture on 98% of the pavement surface area. The contractor must determine the need and include conventional pre-grinding within the lump sum price if necessary, to achieve the specified smoothness levels and/or remove existing texture or to restore the roadway template.

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 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 inch. No unground surface area between passes will be permitted.

Construction of the NGCS test section shall be accomplished as a two-pass procedure requiring two separate operations. The first operation will create the flush ground surface. The flush grind blades shall be mounted on a 4 foot grinding head, stacked with 0.125 inch wide blades separated by 0.035 +/- 0.005 inch wide spacers. 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 grooves shall be 1/8 inch wide and will be 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 photos 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.

SMOOTHNESS REQUIREMENTS

The finished NGCS test section shall have a final profile with a Mean International Roughness Index (MRI) of 50 inches/mile or less. Smoothness acceptance shall be measured following the flush grinding operation and prior to the longitudinal grooving operation.

The smoothness profile shall be generated using lightweight 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.

The contractor shall measure the profile in both wheel paths and average the IRI results to determine acceptance (MRI). The profiles shall be measured 3 feet from each lane line. A guide shall be used to ensure proper alignment of the profile. The Engineer shall have a representative with the lightweight profiler during all testing periods. This representative shall sign the resulting profile form. Segments found not meeting the smoothness requirements will require regrounding at no additional cost to the Contracting Agency.

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.

BASIS OF PAYMENT

NGCS test section construction will be paid for at the lump sum price. 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 RECOMMENDED PRICE ADJUSTMENTS

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

APPENDIX 1: Photos of NGCS Surfaces



Figure 1: Overall View of NGCS Texture

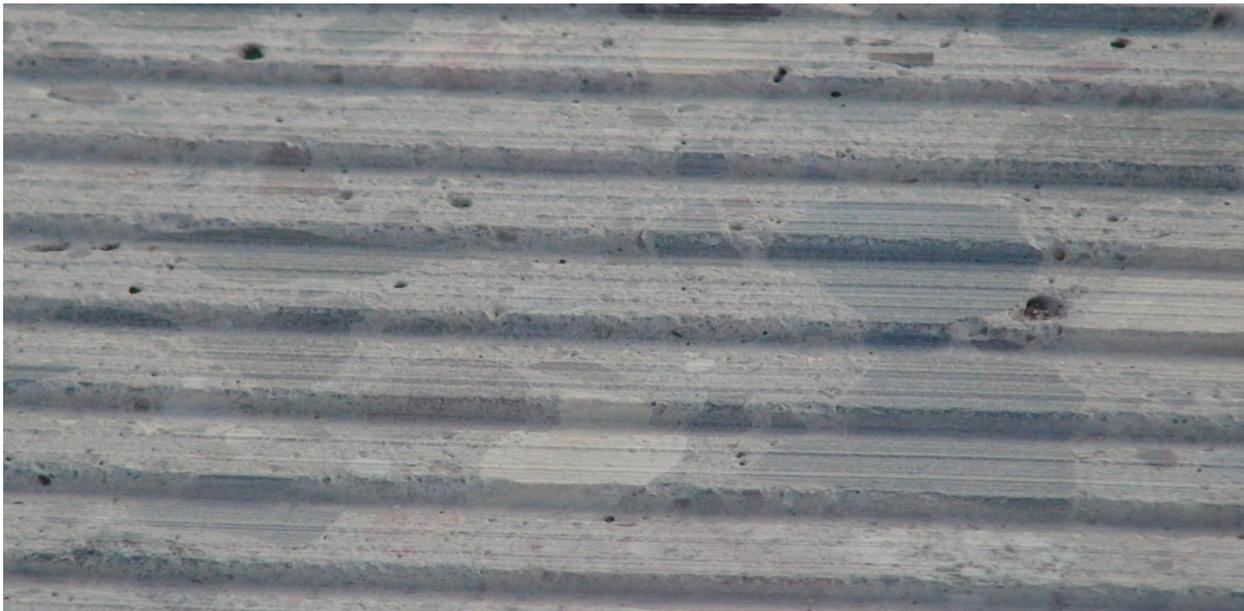


Figure 2: Close Up Photo of Completed NGCS Texture

APPENDIX 1: Photos of NGCS Surfaces



Figure 3: Photo of Flush Grind Immediately After First Pass of Two Pass NGCS Operation

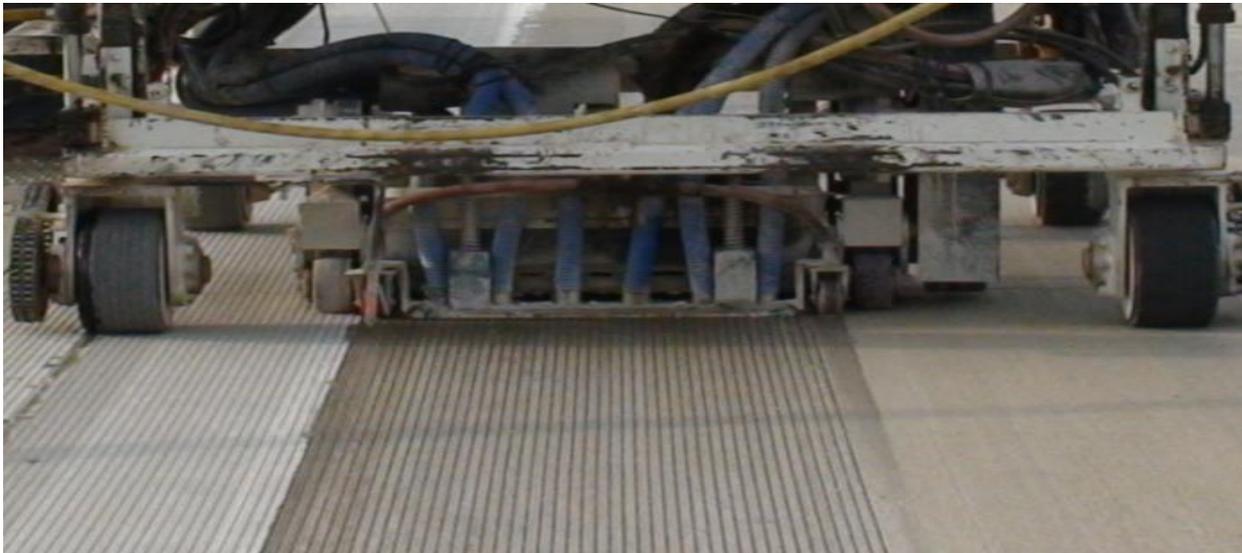


Figure 4: Photo of Grooving Operation of a Two Pass NGCS Operation