

DYNAMIC CUSHION BASE SPECIFICATION

Introduction

This specification applies to construction of a Dynamic Cushion Base (DCB) using specialised unbound gravel product on which a **Rebound Ace® Air Cushion** playing surface may be placed.

Long term performance in terms of planarity of the playing surface depends on the characteristics of the foundation and base and their reaction to changes in environmental conditions such as weather and drainage and vegetation growth around the outside of the court. Provided there are no abnormal moisture conditions (as defined in AS2870-1996, Australian Standard for Residential Slabs and Footing – Construction), DCB of appropriate thickness is suitable for use on foundations classified as Classes A, S and M, i.e. foundation profiles classified as Stable, Slightly Reactive and Moderately Reactive.

Definition of Terms

Terms used in this specification shall be as defined in the following table.

Term	Definition
AS	Australian Standard.
Base	A layer of compacted, imported material constructed by a single lift or multiple lifts that is sufficiently compacted to provide strength and accurately trimmed to line and level.
Coarse component	Fraction of DCB material that does not pass the AS 0.425mm sieve.
Equivalent standard	If AS or QT Standards are not available then an equivalent document covering the same topic produced by either British or American Standards associations.
Fine component	Fraction of DCB material that does pass the AS 0.425mm sieve.
Foundation	Either naturally occurring or placed material that underlies the DCB.
Material source	A site from which DCB material can be won by blasting, ripping or other excavation means from a quarry or pit for use in its natural state or after processing such as crushing, screening or combining with other materials.
Moisture content	Percentage of moisture in a material calculated on a dry weight basis.
QT	Queensland Transport, Department of Main Roads.
Rock	Naturally occurring geological formation; the origin of which is such as to render it a suitable material source as defined in this specification.
Subgrade	Layer of material either insitu or placed upon which the DCB is constructed. Subgrade is uppermost layer of the foundation.

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Standard Test Methods

Standard test methods given in the following table shall be used in conjunction with this specification.

Property to be Tested	AS Number	QT Number
Sample preparation	1289.1.1	Q101
Moisture content	1289.2.1.1	Q102A
Particle size distribution	1289.3.6.1	Q103A
Liquid limit	1289.3.9	Q104A
Plastic limit and plasticity index	1289.3.2.1 & 3.3.1	Q105
Linear shrinkage	1289.3.4.1	Q106
Relative dry density	1289.5.1.1	Q110A
Field moisture content nuclear meter if approved	1289.5.8.1	Q112
California bearing ratio	1289.6.1.1	Q113C
Flakiness index	1141.15	Q201A
Ten percent fines value	-	Q205A
Wet/dry strength variation	1141.22	Q205C
Degradation factor	1141.25.1	Q208A
Crushed particles	-	Q215

Quality Assurance Requirements

All work covered by this specification shall be undertaken in accordance with AVS Quality Assurance System.

Progress of work beyond a “Hold Point” shall only occur after receipt of a written instruction from the Project Control Officer.

Hold Point A Receipt of material source assessment

Delivery of DCB material to site shall not commence until the Project Control Officer has acknowledged receipt of a material source assessment report.

Hold Point B Acceptance of foundation and subgrade preparation

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Placement of DCB shall not proceed until the foundation and subgrade have been accepted as being constructed in accordance with the Specification for Site Preparation, Earthworks, Drainage and Subgrade Preparation or, in the case of a Principal provided site to top of subgrade level, the Principal acknowledges that foundation, drainage and subgrade preparation are critical determinants in the overall performance of the base and playing surface and that it accepts responsibility for foundation and subgrade behaviour and all consequence of such behaviour.

Due to the importance of planarity to tight tolerances of the finished DCB surface, final trim shall not proceed until a series of spot levels have shown that there is a very small probability of low spots and that final trim can produce the required finished surface profile.

Material Source Assessment

Supplier of DCB material shall provide a report on material source assessment, which shall include an investigation of geological site characteristics and source material properties. The extraction and production operations and plant capacity to process the material shall be provided. Source material properties shall be substantiated by laboratory test results, which must be bound into the material source assessment report.

Due to variable nature of most material sources, the assessment should indicate the presence of materials with properties superior to the standards specified in this specification to allow for such variability and to ensure that the requirements for the DCB product are satisfied.

The material source assessment report shall be dispatched to the Project Control Officer at least seven working days prior to commencement of delivery of DCB material to site.

Material

All DCB material incorporated into the work shall be free from sticks, organic matter, clay lumps and other deleterious matter. Visual inspection of the material during and after placement shall be used to ensure compliance with this clause.

DCB material shall be manufactured only from source material, which will produce the coarse component of the final product complying with the standards listed in the following table.

Property	Limit Value
Ten Percent Fines Value (wet) (kN) minimum	100
Wet/Dry Strength Variation (%) maximum	40
Degradation Factor maximum	40
Crushed Particles (%) minimum	70
Flakiness Index General (%) maximum	35

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Fine component of DCB material shall comply with the standards listed in the following table. Standards for both linear shrinkage and plasticity index are given. Only one of these standards need be applied in any particular case.

Property	Limit Value
Liquid limit (%) maximum	20
Plasticity Index (%) maximum	4
Linear Shrinkage (%) maximum	2

Particle size distribution envelope is tabulated below. The grading curve for the material shall be smooth and shall not vary from one outer third of the total limits range between the minimum and maximum limits for one sieve to the opposite outer third of the total limits range for the next lower sieve.

Sieve Size (mm)	Percent Passing by mass
9.5	100
6.7	80 – 100
4.75	70 – 85
2.36	50 – 65
1.18	35 – 50
0.6	24 – 36
0.425	18 – 30
0.3	14 – 26
0.15	6 – 18
0.075	0 – 12

California Bearing Ratio shall be a minimum of 60% (soaked) when compacted to a Relative Dry Density of 100% at Optimum Moisture Content for Standard compactive effort.

Material Compliance Testing

As directed by the Project Control Officer, representative samples of DCB material delivered to site and mixed and spread shall be taken for laboratory testing to confirm compliance with properties specified in Section 6 of this specification. Size of each of these samples shall be such that there is sufficient material to undertake all tests forming the suite of tests nominated by the Project Control Officer. This sampling and testing is in addition to that which may have been undertaken as part of the material source assessment discussed in Section 5 of this specification.

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Ten Percent Fines Value and Wet/Dry Strength Variation tests shall be performed on the fraction of the coarse component that is retained on 4.75mm sieve.

Flakiness Index Test results shall be reported for the total sample.

California Bearing Ratio may be determined by a single point test provided the moisture content is in the range Optimum Moisture Content -1% to $+0.5\%$ and the degree of compaction is $100\% \pm 1\%$ Relative Dry Density to Standard compactive effort.

Construction

Maintenance of Subgrade

In addition to provisions of Hold Point B in Section 4 of this specification, condition of the subgrade must be assessed in the company of the Project Control Officer prior to placement of DCB.

The subgrade surface shall be proof rolled to identify any "soft spots".

Soft spots shall be excavated and recompacted with replacement material as required and the entire surface of the subgrade shall be watered and rolled to provide a tight surface with subgrade material at a moisture content at or close to its Optimum Moisture Content for Standard compactive effort.

Should a significant depth of subgrade material be at a moisture content well dry or well wet of Optimum Moisture Content then the subgrade shall be tyned to a depth of 150mm, moisture content adjusted and recompacted to achieve a Relative Dry Density of at least 98% at a moisture content of Optimum Moisture Content to Optimum Moisture Content plus 2%.

Having prepared the subgrade in accordance with provisions above the subgrade shall be maintained in that condition until covered by DCB.

Moisture Content

Supplier of DCB shall deliver the material to site at a moisture content 1 to 2% wet of its Optimum Moisture Content. Typically, such moisture content would be in the range 7 to 9% calculated on a dry weight basis. Prior to and during placement of DCB the moisture content shall be adjusted slightly to allow optimum compaction of the material.

Segregation

DCB material shall be mixed and spread on site so that the material is homogeneous in nature and that following compaction there is no obvious areas of significant segregation in the material.

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Layer Thicknesses

Individual compacted layer thicknesses shall be chosen to suit the size of the compactor and the adopted construction process. Individual layer thickness shall not be less than 75mm. If there is a delay in the construction process of the DCB then the surface completed prior to the delay shall be lightly scarified, watered as necessary and recompactd as part of compaction of the subsequent layer placed after the construction delay.

Compaction

DCB shall be compacted using a smooth drum, vibrating roller capable of compacting the material to a Relative Dry Density in excess of 98% relative to Standard compactive effort. Initial passes of the compactor shall be performed without vibration followed by sufficient passes with vibration to achieve the required compaction with efficient use of the equipment.

Finished Surface

Surface of the DCB shall be trimmed to the required lines and levels as shown on the drawings or nominated by the Project Control Officer. The finished surface shall be rolled as required to provide a tightly bound surface. Planarity of the finished surface after final trim shall be such that deviation shall no where exceed 3mm under a 3m long straight edge.

Should the surface of the DCB not comply with this planarity requirement, the upper 75mm of the DCB shall be tyned, watered, spread, recompactd and trimmed until the final trim planarity tolerance is achieved.

Construction Compliance Testing

Based on visual assessment of the finished surface of the DCB by the Project Control Officer, there shall be no large areas of significant segregation and the surface shall be tightly bound.

As directed by the Project Control Officer, density testing shall be performed to measure the degree of compaction achieved in the DCB. Project Control Officer will nominate the number and location of tests. Results of all tests must be a Relative Dry Density of 98% or greater relative to Standard compactive effort.

Project Control Officer shall determine the extent of planarity testing. At each location the deviation shall be less that 3mm along the 3m straight edge.

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Surface Sealing

Seal DCB with Rebound DCB Sealer mixture using **Rebound DCB Sealer Concentrate**.

Dilute the product in ratio 1 part concentrate to 2 parts potable water (weight or volume). Water should be slowly added while stirring to ensure good mixing. If a part container is to be used, the concentrate should be thoroughly mixed before pouring of the required amount of concentrate for dilution.

Apply one coat of product at a rate of 1.5litres/m², based on diluted material. Apply with a suitable fan shaped fine nozzle such that the surface fines are not disturbed during application. Use of a high volume, low pressure pump system is recommended.

Apply by fine mist flood coat across width of court, allowing a 50% overlap on each pass of the application nozzle. Allow a minimum 24 hours drying, depending on ambient and substrate conditions.

Once cured the surface should be swept or scraped to dislodge any material sitting above the surface. Failure to do this will result in high drummy spots in the finished surface.

Precautions

Do not apply Rebound DCB Sealer mixture when temperature is below 10°C.

DCB surface should be rolled, and sealed with this mixture as quickly as possible, as rain will damage the prepared surface if it is not sealed.

Surface Preparation for installation of Rebound Ace® Air Cushion system

Apply **Acrylic Filler Coat** (1 coat) using a rubber squeegee and allow to cure for 24 hrs.
Coverage Rate: 0.60 -0.65 L/m²

Scrape down surface with a steel trowel to dislodge any protruding aggregate and sweep down surface.

Patch any damaged or low spots using Rebound Patch Compound.

Spot sand patched areas to obtain a uniform surface.

Thoroughly clean or vacuum court surface and remove any dirt, stones or dust etc, and ensure surface is thoroughly dry before application of **Rebound Ace® Air Cushion** system.