

OUR QUALITY PROMISE

AfriSam's commitment to superior performance gives customers the peace of mind that comes with guaranteed technical excellence, top quality products, sustainability and continuous innovation.

AFRISAM AGGREGATE



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Reducing our
Carbon Footprint

With the planet as one of our core values, we assess the carbon footprint of each and every one of our operations and products while actively striving to drive down our impact on the environment.

www.afrisam.com

Building our Future Together



AfriSam Aggregate

AfriSam has been producing building materials since 1934. Today, we are a leading supplier of quality construction materials and technical solutions. Over the years, we have built up significant expertise.

Our Aggregate division supplies aggregate material to Gauteng, Mpumalanga, KwaZulu-Natal and the Western Cape. Our coarse aggregate and crusher sands are processed from a wide range of geological rock types, while our sands may be from natural sources such as pit or river sand, or may be produced by crushing and screening of aggregate material.

As members of the Aggregate & Sand Producers Association of Southern Africa (ASPASA), our plants are subject to regular inspection. We are fully committed to complying with relevant statutory and regulatory requirements, as well as our own stringent Environmental, Health and Safety and BBBEE policies.

Factors to consider when selecting an aggregate source:

Depending on the geological rock type found in the area, the aggregate material from our quarries has different properties. AfriSam has the expertise to ensure the correct selection of aggregates in your region. In choosing the correct aggregate product for the application, some information and technical

detail regarding the influence of various characteristics and properties is required.

These include:

- Apparent relative density.
- Water absorption.
- Aggregate Crushing Value (ACV) and 10% Fine Aggregate Crushing Test (FACT).
- Polished Stone Value (PSV) and Los Angeles Abrasion.
- Quality.
- Physical properties.
- Grading limits.
- Fine content.
- Dust content.
- Flakiness index.
- Geological properties.
- Skid resistance.
- Cost.
- Climate.



Ballast

Ballast is aggregate material used as the foundation in the construction of rail tracks and is usually made from crushed stone. It is packed between, below and around the rail sleepers or ties, and serves a number of purposes.

These include:

- Facilitating drainage of water around the tracks.
- Bearing and transmitting the load from the railroad ties.
- Providing uniform support.
- Anchoring the track.
- Preventing vegetation growth.
- Resisting aggregate degradation.
- Facilitating maintenance operations.
- Resisting fouling.
- Minimising climatic influences.

Features of ballast:

- Drainable.
- Stable.
- Strong and hard wearing.
- Easy to clean.
- Low flakiness index.
- Correct shape.

Ballast has to meet certain requirements in order to satisfy the above criteria. Below is the compliance criteria as specified in Spoornet S406 for ballast.

Spoornet S406 test requirements and limits	Compliance criteria
Grading	SANS 1083
Flakiness Index	<30%
Relative Density	>2,5
Voids Content	>40%
LA Abrasion	<22%
Plasticity Index	<6
Mill Abrasion	<7%
Soundness	<5%



Concrete Aggregate

Concrete Aggregate is a broad term referring to the use of coarse material such as sand, gravel, crushed stone and recycled concrete used in the manufacture of concrete. Essentially, aggregate materials make up a large portion of the total volume of concrete and serve to enhance its overall strength.

AfriSam Concrete Aggregate materials vary in composition from one area to another depending on the type of parent rock or source. As such, it is important to consider all technical elements when starting on a project.

Factors to consider when choosing aggregate for use in concrete:

- Aggregate type.
- Type of binder and cement characteristics such as gypsum or alkali content.
- Total cementitious content.
- Water:cement ratio.
- Degree of hydration or cementing reaction.
- Total water content in the fresh concrete.
- Environment and exposure conditions of the concrete.
- Surface:volume ratio of the concrete as affected by shape and size of elements.

Extracts taken from "Shrinkage" by Nick Doulgeris.

Note: All typical gradings and water demands may be obtained on request from our technical department.



Materials specifications:

- When batching concrete, one should ensure that the aggregate does not contain any deleterious material as this can have a negative effect on the mix.
- One should also be aware of the water demand of the fine aggregate as this is very important in ensuring the control of cement content in the mix.

Quick guide to stone sizes for different concrete applications:

26,5mm	Foundations Deep suspended slabs Industrial floors thicker than 120mm
22 or 19mm	Floors Paths Patios Driveways
13,2 or 9,5mm	Thin suspended slabs Precast lintels, flagstones, bricks and blocks Other elements with section thickness ranging from 40 to 50mm

Road layer works material

Base and sub-base materials are those materials that provide the supporting structure in any pavement design.

The table below provides G1 to G7 classifications.

Requirements for approved target grading:

SANS 1200-M and Colto requirements state that the aggregate for bases and sub-bases should be derived from hard, sound and durable rock.

Approved target gradings are determined by laying a trial section using material complying with grading limits given in the table below. Prior to compaction, six samples of the material in situ are taken and subjected to grading analysis. The resultant (smoothed) grading curve is then classified as the approved target grading for that project and all future grading results are evaluated against this target.

Note: Approved target gradings are not used by AfriSam to produce product.

Hardness:

The hardness and particle shape of aggregate used in road layer works is important as these influence the workability, compaction and density achieved.

Soluble salt requirements:

Colto requirements recommend the following on site:

For quartzite, tillite, shale and G1 to G4 materials, measure the soluble salts against pH or electrical conductivity.

- Use the material if the pH is >10 after treatment at the crushing plant, and subsequently remains = 8,0.

- If the pH is <6,0 treat with lime until the pH = 10,0 before use. For natural gravel and other crushed aggregate, use the material if the electrical conductivity (EC) is 0,15 Sm⁻², but pay particular attention to design and construction if the pH = 6,0.

- If the pH = 6,0, the EC is 0,02 Sm⁻² and sulphates are not a problem, use the material. If not, analyse the material in accordance with the customer's instructions and submit a proposal for approval.

- Where the salinity of water added for compaction causes the salinity of the material to increase, determine soluble salinity within 24 hours of compaction before prime coat is applied.

Use	Classification	Nominal maximum size, mm		Additional fines allowed
Base and sub-base	G1	37,5		Only from parent rock
	G2			Up to 10% natural fines
	G3	37,5 or 26,5		Up to 15% natural fines
Pavement layers	G4	Crushed:	37,5 or 26,5	Natural materials
		Uncrushed:	53	
	G5	Crushed:	53	
		Uncrushed:	63	
	G6	Crushed:	53	
		Uncrushed:	Two-thirds of compacted layer thickness	
G7	Crushed:	75	N/A	
	Uncrushed:	Two-thirds of compacted layer thickness		



Road stone Aggregate

Product overview:

Road Stone Aggregate are those materials used in asphalt pavements. Asphalt is defined as a mixture of inert mineral matter, such as aggregate, mineral filler and bituminous binder in predetermined proportions.

Types of asphalt:

There are different types of asphalt. These are:

Continuously Graded Asphalts

These are mechanically mixed asphalts in which the aggregates and the filler are distributed in size from coarse to fine fractions within a specific smooth grading envelope.

- Large Aggregate Mixes for Bases and Surfaces (LAMBS).
- Asphalt Continuously Graded Medium (ACGM).
- Asphalt Continuously Graded Fine (ACGF).
- Slurry Seal.

Gap Graded and Semi-gap Graded Asphalts

These are mechanically mixed asphalts from which some intermediate sizes are omitted to comply with a stepped grading envelope. These asphalt layers either contain a 19mm or 26mm maximum aggregate size.

Open Graded Asphalts (aggregate skeleton mixes)

These are mixes which normally require single-sized crushed aggregate. It is mechanically mixed asphalt constituted to give a rough surface texture in the compacted state. This type of layer is also used when ultra-thin pavement is laid using pavers.

This design normally focuses on a single size material of either 13,2mm or 9,5mm combined with a -3mm sand having a high dust content. Some of the names used in the industry are:

- Stone Mastic Asphalt (SMA).
- Nova Chip.
- Gripphalt.
- Bitumen Rubber Asphalt Semi-open (BRASO).
- Bitumen Rubber Asphalt Course (BRAC).

Quality requirements for asphalt:

Due to the importance of the aggregate in the mix, it is important to understand the impact of its properties. The customer must conduct the necessary tests to produce and maintain a mix meeting the design requirements. Consider the properties listed under 'Factors to consider when choosing an aggregate source'.



Surfacing Aggregate

Surfacing Aggregates are the aggregates used in the production of the surface layers or seals for road construction. These are usually applied by chip spreaders and comply with certain specifications. The process involves spraying a bitumen binder onto a prepared base-course layer and then applying aggregate particles immediately after and rolling them in to achieve a mosaic pattern. This causes the binder to move into voids between the particles.

There are a number of seals in use:

- **Single Seals** are used in the construction of new surfaces as well as rehabilitation of existing surfaces. Traffic volume determines the aggregate size and a second binder layer may be applied if stone exceeds 13,2mm. Pre-coating may improve adhesion.
- **Double Seals** are constructed in two layers, with the top layer containing smaller aggregate than the bottom. Larger aggregate sizes are used for roads carrying heavy traffic.
- **Slurry Seals** are used to achieve uniform texture on roads with varying surfaces and also for pre-treatment before applying single or double seals (not advisable for smooth textured surfaces).
- **Sand Seals** are used in low-cost construction, for low traffic roads, as dust palliatives and also as pre-treatment for single- or double-layer surfaces. Water may be required to assist in the screening process and to clean the sand of excess fines.

In addition, the following requirements apply:

- **Hardness** – When tested with standard test methods, the ACV should not exceed 21% and the 10% FACT (dry) value must be at least 210kN. The wet:dry ratio should be at least 75%. PSV should be at least 50%, unless otherwise specified or approved by the engineer.
- **Particle shape** – Where stated in the project, the Average Least Dimension (ALD) should comply with the figure indicated.
- **Sand properties and sand equivalent** – Sand for slurry should be an approved crusher sand obtained from parent rock with an ACV not exceeding 30%, or a mixture of crusher sand not more than 25% clean natural sand. This must also comply with project specifications.



Products and properties: Gauteng

Product		Plant and rock type							
		EIKENHOF Andesite	FERRO (Pretoria) Meta-quartzite	JUKSKEI (Midrand) Granite	OLIFANTSFONTEIN Dolomite	ROODEKRANS (Brakpan) Granite	ROOIKRAAL Dolerite	SUB-NIGEL (Nigel) Reef quartzite	ZEEKOEWATER (Witbank) Felsite
Concrete aggregate	22mm								
	13,2mm								
	9,5mm								
	6,7mm								
Crusher sand	Unwashed								
	Washed								
	-5mm washed								
	-6mm								
Base	-8mm								
	G1								
	G2								
Sub-base	G3								
	G5								
Roadstone	G6								
	G7								
	19,0mm								
	13,2mm								
Ballast	9,5mm								
	6,7mm								
	Minus 73,0mm								

Specials								
Builder's blend								
Dumprock selected								
Dumprock unselected								
Shot rock								

Properties	Eik	Ferro	Juk	Oli	Rood	Rooi	Sub-N	Zeek
RD	2,94	2,66	2,65	2,86	2,76	3,0	2,77	2,67
Water absorption, %	0,5	0,3	0,5	0,4	0,5	0,6	0,4	0,3
ACV, % (dry)	5,9	13,1	21,7	12,8	17,7	8,9	12,7	13,3

Available
 Not available

Products and properties: Western Cape

Product		Plant and rock type		
		PENINSULA (Durbanville) Meta-greywacke	PHILIPPI Meta-greywacke	RHEEBOK (Malmesbury) Granite
Concrete aggregate	53,0mm			
	37,5mm			
	26,5mm			
	19,0mm			
	13,2mm			
	9,5mm			
Crusher sand	6,7mm			
	Unwashed			
Base	Washed			
	G1			
Sub-base	G2			
	G3			
	G5			
Road stone	G6			
	G7			
	19,0mm			
	13,2mm			
Ballast	9,5mm			
	6,7mm			
	53,0mm			
	73,0mm			

Specials*			
6mm Flats			
Gravel, 25mm			
Grit, -4mm/2mm			
Gabion			
Overburden			
9/25 ROC			
9mm UTFC			

*Available on request

Properties	Peninsula	Rheebok
RD	2,72	2,62
Water absorption, %	0,4	0,4
ACV, % (dry)	7,9	14,9
10% FACT, kN (dry)	480	300
PSV	54	52
Los Angeles Abrasion, %	11,7	13,4

Available
 Not available

Products and properties: KwaZulu-Natal

Product		Plant and rock type						
		COEDMORE (Bellair) Ortho-quartzite	LADYSMITH Dolerite	LADYSMITH Siltstone	NEWCASTLE Dolerite	PIETERMARTITZBURG Dolerite	UMLAAS ROAD (Camperdown) Tillite	VERULAM Tillite
Concrete aggregate	53,0mm							
	37,5mm							
	26,5mm							
	19,0mm							
	13,2mm							
Crusher sand	9,5mm							
	6,7mm							
	Unwashed							
Base	G1							
	G2							
Sub-base	G4							
	G5							
	G6							
	G7							
Roadstone	26,5mm							
	19,0mm							
	13,2mm							
	9,5mm							
Rolled-in chips	6,7mm							
	19,0mm							
Ballast	13,2mm							
	63,0mm							
	53,0mm							

Specials							
Builder's blend							
Dumprock							
First crush							
Handstone							

Properties	Coed	Lady (dol)	Lady (silt)	Newcastle	PMB	Umlaas Rd	Verulam
RD	2,7	2,97	2,75	3,0	2,92	2,71	2,69
Water absorption,	0,8	0,5	2,7	0,5	0,7	0,85	0,9
ACV, % (dry)	16,6	10,1	11,5	12,8	11,5	11,9	13,3
10% FACT, kN (dry)	240	383	362	325	385	350	308
PSV	53	-	-	-	-	-	52

Available
 Not available

AfriSam locations

