Dear visitor;

Premixed concrete, also known as ready-mix concrete, is a type of concrete that is manufactured in a factory or batching plant according to a specific mix design. This pre-prepared product is delivered to construction sites in a ready-to-use state. Premixed concrete is categorized into different classes based on its strength, composition, and intended use. These classes are often defined by numbers, indicating the concrete's compressive strength, typically measured in megapascals (MPa) in metric units. Here's a breakdown of common concrete classes that we produce:

C8/10 | C12/15 | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55

1. Normal Strength Concrete (NSC):

- Classes:C8, C12, C16, C20
- Suitable for general construction purposes such as residential buildings.

2. Standard/Ordinary Concrete:

- Classes: C25, C30, C35
- Typically used for moderate structural requirements.

3. High-Strength Concrete (HSC):

- Classes:C40, C45, C50, up to C100 and beyond
- Designed for specialized structures like high-rise buildings and bridges.

Above those standart concrete, Betonsa Ghana Limited finds a solution among their clints requirements;

4. Water Resistant Concrete:

- Contains water resistant chemical to avoid the water pass through it.
- Used in swimming pool walls or structures and water reservoir etc.

5. Heavyweight Concrete:

- Uses heavy aggregates for increased density.
- Often used in radiation shielding or counterweights.

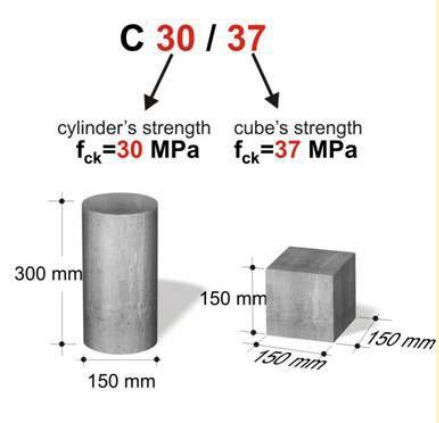
6. Self-Compacting Concrete (SCC):

- Flows easily into molds without mechanical vibration.
- Classes can vary based on application needs.

7. Fiber-Reinforced Concrete:

- Contains fibers for added strength and durability.
- Classes vary based on fiber type and content.

These classes are guidelines and can vary by country based on local standards and construction codes. The choice of concrete class depends on the specific structural requirements, environmental conditions, and construction practices. Consulting with a structural engineer or concrete specialist can provide clarity on the appropriate class for a particular project. If you have further question please contact Betonsa team via website.



Here is some description how to understand basic class of premixed concrete. The standard requirement for the time necessary to test the compressive strength of concrete is typically at specific intervals, commonly 7 days and 28 days, with 28 days being the most standard and significant time frame. These tests are crucial for determining whether the concrete mix meets the specified design criteria and for making necessary adjustments in the construction process. The results guide engineers and builders in ensuring that the concrete will perform as needed in the intended structure.

7-Day Strength Test:

- This test provides an early indication of the potential strength of the concrete. At 7 days, concrete has usually reached about 60-70% of its 28-day strength.

28-Day Strength Test:

- The 28-day mark is the standard time frame for most concrete strength assessments. At this point, concrete is expected to have reached its full or close to its full design strength, serving as a reliable benchmark for structural integrity.

Therefore, here is the chart that Betonsa product expectation of 28 days result on cubic test;

CLASS	C8/10	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55
MPa	10	15	20	25	30	37	45	50	55

Mix Design of concrete

Concrete mix design is the process of selecting suitable ingredients for concrete and determining their relative proportions to produce a concrete with desired properties, such as strength, durability, and workability. Here's an overview of the key components and considerations involved in concrete mix design:

1. Cement:

- The binder that holds the concrete together. The type and quality of cement can affect the strength and setting time.

2. Aggregates:

- Coarse Aggregates: Typically gravel or crushed stone, providing bulk to the mix.

- Fine Aggregates: Sand or crushed stone fines that fill voids between coarse aggregates.

3. Water:

- Essential for the chemical reaction with cement (hydration) that allows the mix to set and gain strength. The water-to-cement ratio is critical for determining the strength and durability of concrete.

4. Admixtures:

- Chemical additives used to improve workability, accelerate or retard setting time, increase strength, or achieve other specific properties.

Considerations in Design

1. Strength Requirements:

- Determine the compressive strength needed for the structure, which affects the proportions of the materials used.

2. Workability:

- The ease with which concrete can be mixed, placed, and finished. It's influenced by the water content, aggregate shape, and use of admixtures.

3. Durability:

- Depending on the exposure conditions (e.g., freezing, chloride exposure), the mix must be designed to resist deterioration.

4. Slump:

- A measure of the concrete's consistency. The desired slump value depends on the application and placement method.

5. Economy:

- Balancing cost with required properties is crucial, often achieved by optimizing the use of materials.

Steps in Mix Design

1. Define Requirements:

- Establish the structure's needs, including strength, workability, and environmental conditions.

2. Select Ingredients:

- Choose appropriate types of cement, aggregates, water, and admixtures.

3. Determine Proportions:

- Calculate the ideal ratio of components to achieve the desired properties based on guidelines (e.g., ACI, British Standards).

4. Perform Trials:

- Mix small batches to test properties such as workability and strength, adjusting as necessary.

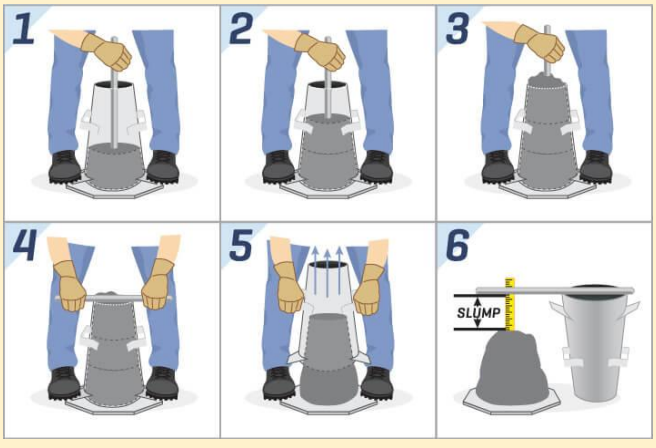
5. Evaluate and Adjust:

- Based on trial results, tweak proportions to meet design requirements.

Concrete mix design is a complex yet essential process in construction, ensuring the structural integrity, longevity, and performance of concrete structures.

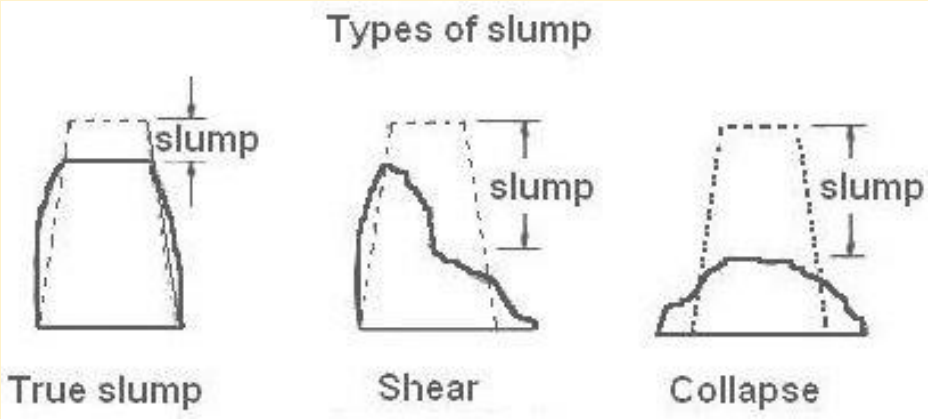
<u>Concrete slump</u>

Concrete slump is a measure of the consistency, workability, and fluidity of freshly mixed concrete. It is an essential test in the construction industry to ensure that the concrete mixture is suitable for pouring and can be properly worked and compacted. Here's a breakdown of what you need to know about concrete slump:



- Purpose: The slump test determines the workability and consistency of concrete. It helps in assessing the ease with which concrete can be mixed, transported, placed, and finished.

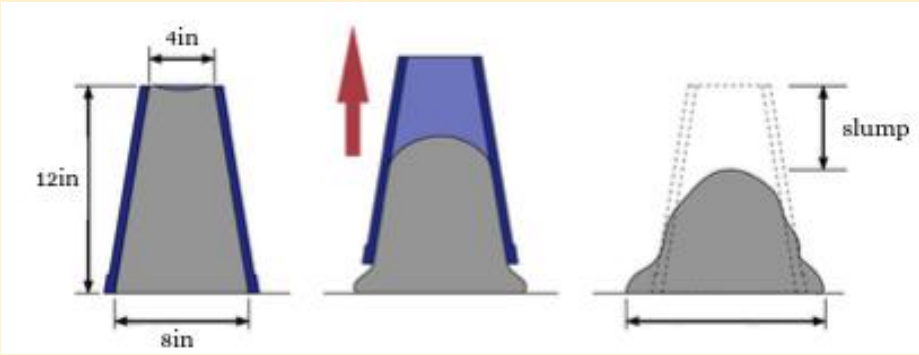
- Procedure: A slump cone (also known as an Abrams cone) is used for the test. The cone is 30 cm tall, with a base diameter of 20 cm and a top diameter of 10 cm. The cone is placed on a flat, non-absorbent surface and filled with fresh concrete in three layers. Each layer is tamped 25 times with a standard rod to remove air pockets. After the cone is fully filled, the top is leveled, and the cone is lifted vertically without disturbing the concrete. The slump is measured by the difference in height between the top of the cone and the top of the concrete after it has slumped.



- **True Slump:** Ideal slump test results in a uniform subsidence of the concrete mass. It indicates a consistent mix with suitable workability.

- **Shear Slump:** When part of the concrete shears off and slips sideways, indicating a lack of cohesion in the mix.

- **Collapse Slump:** When the concrete collapses completely, usually a sign that the mix is too wet and lacks cohesion.



- **Low Slump (0-90 mm):** Suitable for dry mixes used in road construction.

- **Medium Slump (100-180 mm):** Ideal for general-purpose concrete work.

- **High Slump (180 above):** Used for areas with dense rebar or complex work requiring high workability.

- Quality Control: Ensures the concrete mix has the right water-cement ratio, impacting strength, setting time, and durability.

- Batch Consistency: Helps maintain uniformity across batches, especially on large construction sites.

The right slump doesn't only ensure ease of handling and pouring, but it also contributes to the final structural integrity of the concrete when it sets and hardens. Here is the chart for concrete slump classes BS 8500;

CLASS BS 8500	SLUMP RANGE (mm)	TARGET SLUMP (mm)
S1	10-40	20
S2	50-90	70
S3	100-150	130
S4	160-210	180
S5	210-N/A	220

Class S1:

- Slump Range: 10-40 mm

- Characteristics: Very low workability, used for road construction and pavements.

Class S2:

- Slump Range: 50-90 mm

- Characteristics: Low workability, suitable for manually compacted flat slabs.

Class S3:

- Slump Range: 100-150 mm

- Characteristics: Medium workability, suitable for normal reinforced concrete placed with vibration.

Class S4:

- Slump Range: 160-210 mm

- Characteristics: High workability, used for complex structures and pumping applications.

Class S5:

- Slump Range: >210 mm

- Characteristics: Very high workability, used where concrete is placed with little or no compaction needed.

These classes help in determining how easily the concrete can be mixed, transported, and placed. Each class is suited to different types of construction work, depending on the required strength and method of placement.

Delivery of Concrete

Delivering premixed concrete is a critical component of many construction projects. Here's an overview of what you need to know:

1. Ordering:

- Specific requirements such as concrete strength, slump, aggregate size, and any additives must be specified.

- Timing is crucial, as concrete begins to set shortly after mixing.

2. Transportation:

- Concrete is delivered using a mixer truck, which continuously rotates to prevent the concrete from setting.

- The distance from the plant to the site should be minimized to avoid delays.

3. Handling and Delivery:

- Upon arrival, the concrete must be placed and finished quickly.

- Equipment such as chutes or pumps may be used to place the concrete precisely where needed.

- Trained personnel should handle the unloading to ensure proper distribution and prevent waste.

Key Considerations

- Time Sensitivity:

- Concrete typically needs to be poured within 120 minutes of mixing to maintain its quality.

- Site Accessibility:

- Ensure that the delivery truck has clear access to the site.

- Plan the route to accommodate the truck's size and turning requirements.

- Weather Conditions:

- Extreme weather (hot, cold, rainy) can affect the concrete setting time and quality. Plan accordingly.

- Communication:

- Clear communication between the concrete supplier, contractor, and site personnel is essential for timely and efficient delivery.

- Safety Protocols:

- Follow all safety guidelines to protect workers and equipment. Proper PPE (Personal Protective Equipment) should be worn by all involved.

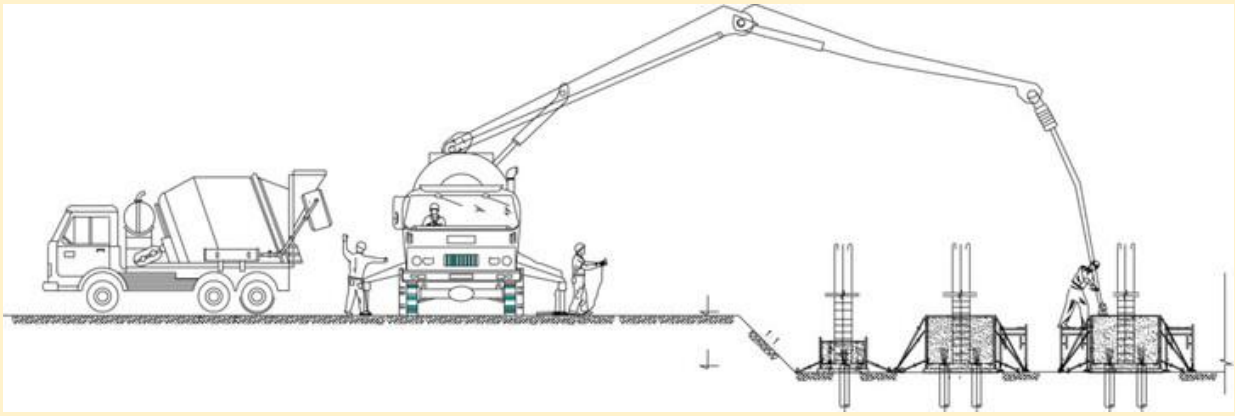
- Quality Assurance:

- Conduct tests on site if necessary, such as slump test or temperature checks, to ensure that the concrete meets project specifications.

In summary, the delivery of premixed concrete is a precise operation that requires careful planning and coordination. Ensuring all aspects from ordering to placement are managed effectively will help achieve optimal results in the construction project.

Pumping of concrete

Concrete pumping is an efficient method for placing concrete at various construction sites, especially where traditional methods might be impractical.



Concrete pumping involves the use of a machine to transfer liquid concrete to a specific location. It enables precise placement and is particularly useful for large-scale projects, high-rise buildings, or sites with difficult access.

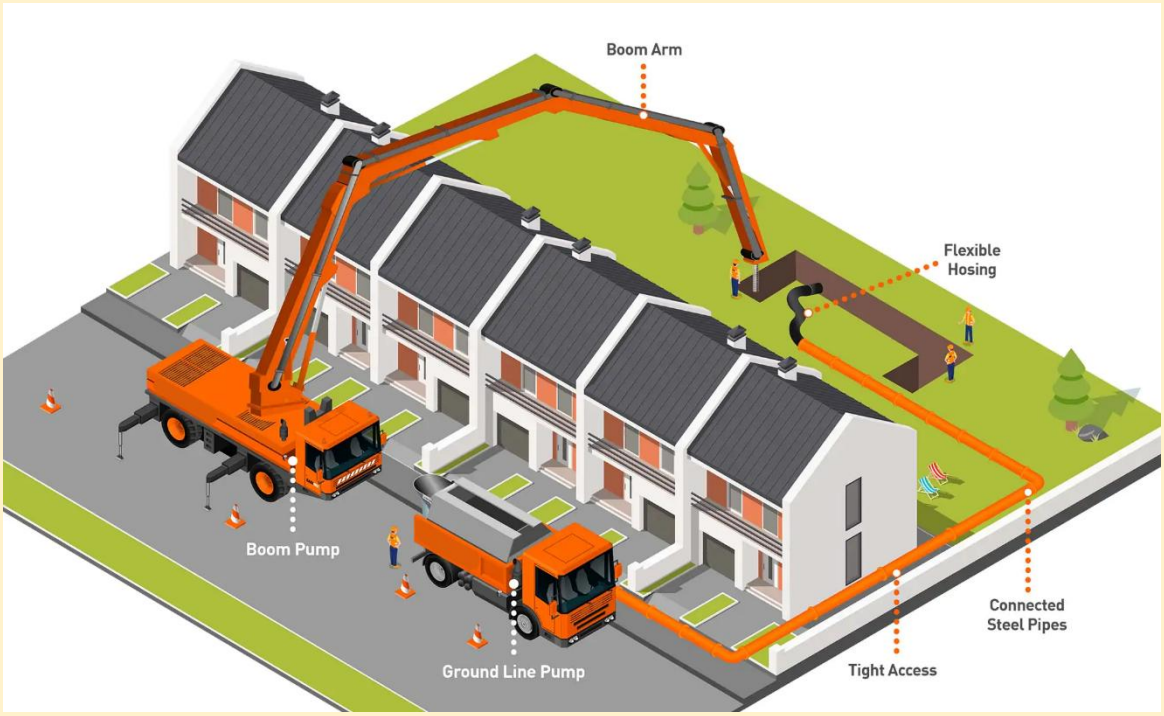
Types of Concrete Pumps

1. Boom Pump:

- Equipped with a hydraulic arm (boom) that can extend to reach various areas.
- Ideal for pouring concrete at heights and over obstacles.

2. Line Pump:

- Uses flexible or steel hoses connected to a pump.
- Suitable for small projects, residential work, and ground slabs.



Benefits of Concrete Pumping

- Efficiency:

- Faster and more uniform pouring than manual methods.
- Reduces labor costs and time involved in concrete placement.

- Precision:

- Accurate placement of concrete in difficult-to-reach areas.
- Minimizes wastage and ensures quality.

- Versatility:

- Adaptable to varying site conditions.
- Capable of handling large volumes and different types of concrete mixes.

- Safety:

- Reduces the need for on-site labor near potentially hazardous areas.

- Minimizes manual handling, reducing injury risks.

Key Considerations

- Site Preparation:

- Ensure stable ground and sufficient space for the pump to operate.

- Plan the pump's access route and setup location meticulously.

- Mix Design:

- Concrete should be compatible with pumping to avoid blockages.

- Consider additives for specific properties like workability or setting time.

- Coordination:

- Synchronize with concrete supply to maintain a continuous flow.

- Communicate with all personnel involved to ensure safety and efficiency.

- Environmental Factors:

- Weather conditions can impact concrete pumping, especially extreme temperatures that alter setting times.

- Noise and emissions should be managed in residential or populated areas.

Common Applications

- High-Rise Construction:

- Facilitates concrete placement at great heights.

- Foundations and Slabs:

- Suitable for large, flat areas requiring quick, even distribution.

- Architectural Structures:

- Allows for intricate designs with precise placement.

Concrete pumping is a versatile and efficient method in modern construction, offering a solution for various challenges associated with traditional concrete placement. By properly planning and managing the process, it can significantly enhance the speed and quality of construction projects.

Curing of Concrete

Concrete curing is a vital process in ensuring that the concrete achieves its desired strength and durability. Here's a brief overview:

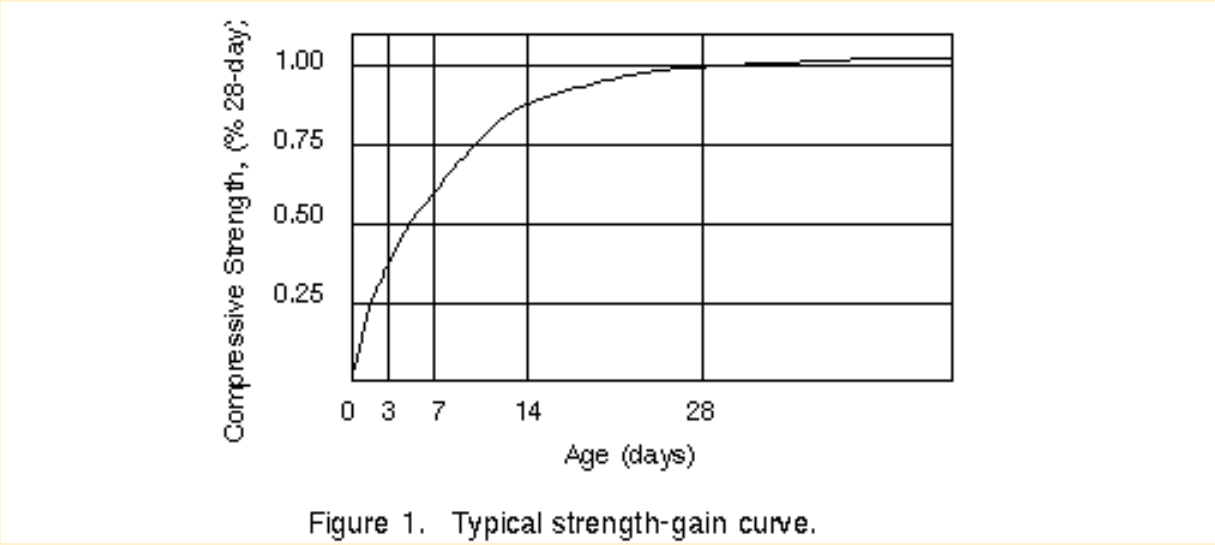


Figure 1. Typical strength-gain curve.

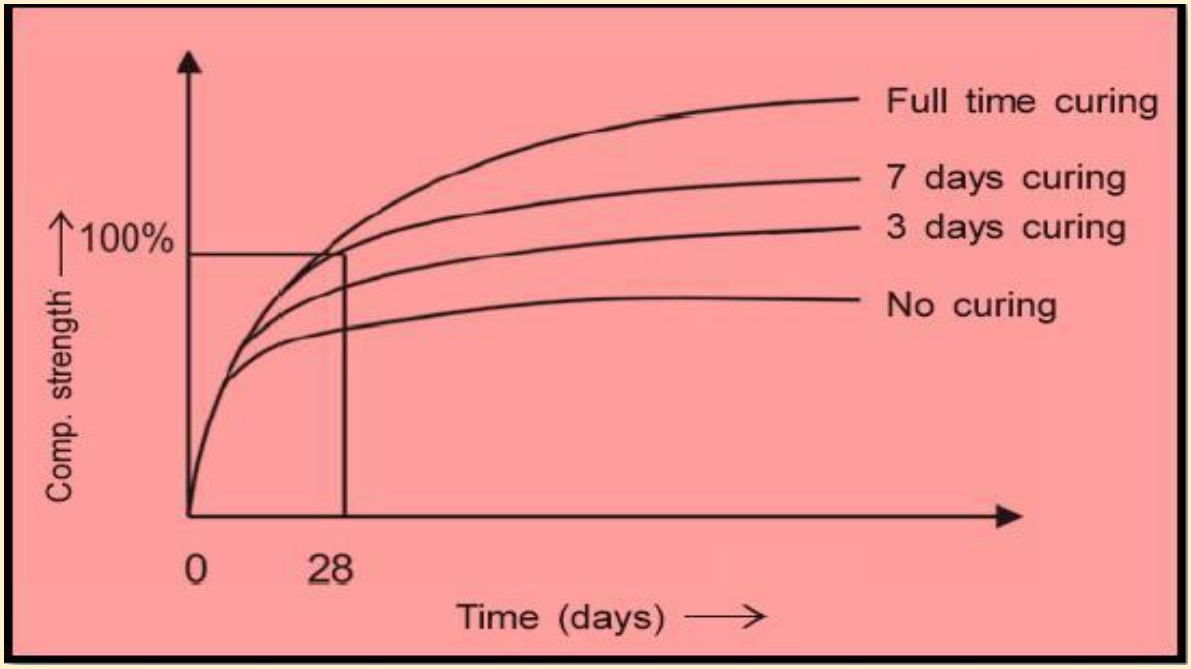
What is Concrete Curing?

Curing is the process of maintaining adequate moisture, temperature, and time to allow the concrete to achieve the desired properties for its intended use.

1. Strength Development: Proper curing ensures the concrete develops sufficient strength to support structural loads.

2. Durability: Well-cured concrete is more resistant to weathering, chemical exposure, and abrasion.

3. Minimizing Cracking: Curing helps prevent surface shrinkage cracking by keeping the surface moist.



Basic Curing Methods

1. Water Curing: Directly supplying water to the surface (might be through ponding or misting) to keep it moist.

2. Sealing in Moisture: Using plastic sheets, wet burlaps, or curing compounds to trap moisture in the concrete.

3. Steam Curing: Common in precast concrete production to speed up the hydration process by applying heat and moisture.

Curing Duration

- The curing process can vary depending on factors such as the type of concrete, environmental conditions, and specific project requirements. Generally, curing should be continued for at least 7 days for ordinary Portland Cement. For more rapid strength gain, curing may be extended for several weeks.

Best Practices

- Begin curing as soon as possible after the concrete has set enough to resist marring.

- Maintain a constant temperature; avoid extreme temperature fluctuations.

- Monitor and Adjust: Inspect regularly and adjust moisture levels accordingly.

Special Considerations

- Cold Weather Curing: Extra insulation or heating methods may be needed.

- Hot Weather Curing: Rapid evaporation might necessitate additional water or covers to maintain moisture. Especially in Ghana weather conditions.

In summary, proper curing practices are crucial for achieving optimal strength, durability, and performance of concrete structures.

Removal of formwork

Removing concrete formwork, a critical step after casting, requires careful attention to timing and techniques to ensure structural integrity and surface quality. Here's a brief guide:

Timing for Formwork Removal

1. Strength Requirements: Formwork should only be removed when the concrete has gained sufficient strength to carry its own weight and any imposed loads. Typically, this might be around:

- 7 days for walls and columns.

- 14-28 days for structural elements like beams and slabs, depending on concrete mix and environmental conditions.

2. Environmental Factors: Temperature and humidity can influence curing time and thereby the timing for formwork removal.

Guidelines for Safe Removal

1. Refer to Specification: Always follow project-specific plans and guidelines, as engineers may specify different times based on mix design and structural load requirements.

2. Gradual Process: Start removal in stages, especially for more complex or critical structural sections, to reduce stress and potential damage.

3. Monitoring: Check for signs of concrete curing and strength gain, such as surface hardness and color change, before removal.

Techniques for Formwork Removal

1. Avoid Sudden Releases: Gently loosen formwork to avoid jerking or sudden vibrations that can crack the concrete.

2. Use Proper Tools: Employ tools designed for formwork removal—hammers, bars, and wedges—carefully to prevent damage to concrete.

3. Inspect Surfaces: After formwork removal, inspect the concrete surfaces for any defects, honeycombing, or surface irregularities, so repairs can be done promptly.

Safety and Quality Considerations

- Safety Gear: Workers should use appropriate PPE, including gloves, helmets, and safety boots.

- Support Elements: Leave supporting props or shoring in place for a longer duration, if necessary, especially under slabs or beams, until they have achieved the required structural strength.

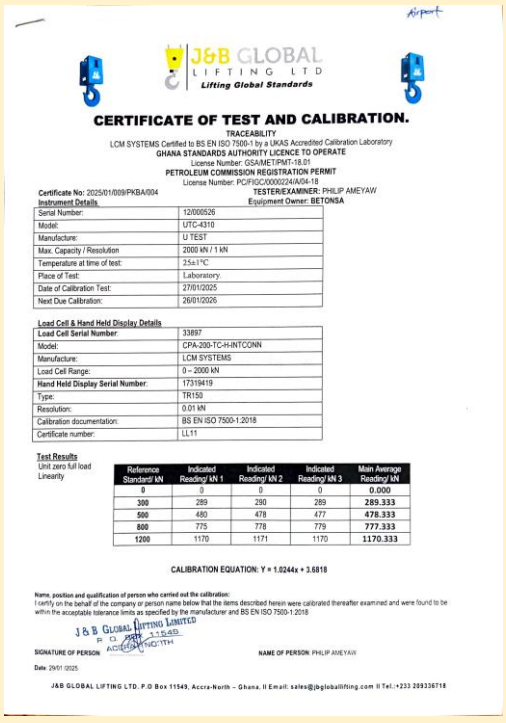
-Avoid Disturbance: Ensure the area is free from excessive loads or disturbances during and immediately after form removal.

Exclusive attention to formwork removal processes and timings ensures the concrete maintains its designed strength, quality, and appearance.

DOCUMENTS / TEST RESULT / CERTIFICATE

P.S. Certificates are given here as sample. Please contact with Betonsa Ghana Limited for updated once.

Calibration certificate of airport crush machine (BS EN ISO 7500-1:2018 cer.no.LL11)



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CERTIFICATE OF TEST AND CALIBRATION.

TRACEABILITY
LCM SYSTEMS Certified to BS EN ISO 7500-1 by a UKAS Accredited Calibration Laboratory
GHANA STANDARDS AUTHORITY LICENCE TO OPERATE
License Number: GSA/MET/PMT-18.01
PETROLEUM COMMISSION REGISTRATION PERMIT
License Number: PCP/QC/00002/24/A/04-18

Certificate No: 2025/01/009/PKBA/004 — TESTER/EXAMINER: PHILIP AMEYAW
Equipment Owner: BETONSA

Instrument Details

Serial Number:	12/000526
Model:	UTC-4310
Manufacture:	U TEST
Max. Capacity / Resolution	2000 kN / 1 kN
Temperature at time of test:	25±3°C
Place of Test:	Laboratory.
Date of Calibration Test:	27/01/2025
Next Due Calibration:	26/01/2026

Load Cell & Hand Held Display Details

Load Cell Serial Number:	33897
Model:	CPA-200-TC-H-INTCONN
Manufacture:	LCM SYSTEMS
Load Cell Range:	0 – 2000 kN
Hand Held Display Serial Number:	17319419
Type:	TR150
Resolution:	0.01 kN
Calibration documentation:	BS EN ISO 7500-1:2018
Certificate number:	LL11

Test Results
Unit zero full load
Linearity

Reference Standard/ kN	Indicated Reading/ kN 1	Indicated Reading/ kN 2	Indicated Reading/ kN 3	Main Average Reading/ kN
0	0	0	0	0.000
300	289	290	289	289.333
500	480	478	477	478.333
800	775	778	779	777.333
1200	1170	1171	1170	1170.333

CALIBRATION EQUATION: Y = 1.6244x + 3.6818

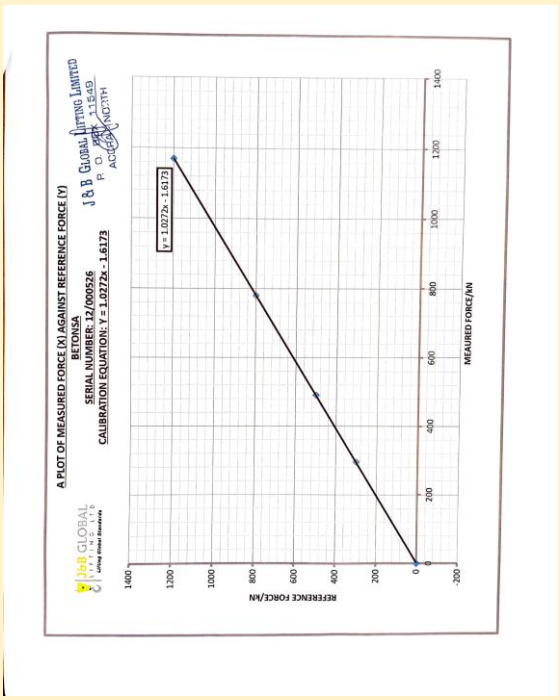
Name, position and qualification of person who carried out the calibration:
I certify on the behalf of the company or person name below that the items described herein were calibrated thereafter examined and were found to be within the acceptable tolerance limits as specified by the manufacturer and BS EN ISO 7500-1:2018

J & B GLOBAL LIFTING LIMITED P. O. BOX 11549 ACCRA-NORTH

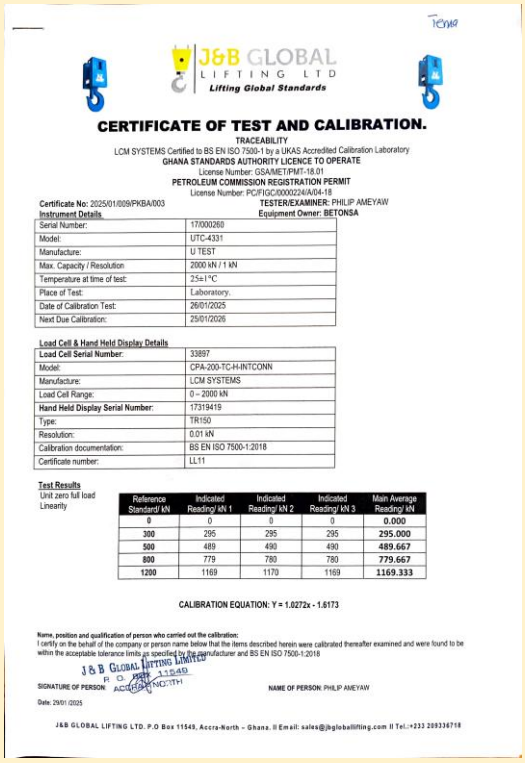
SIGNATURE OF PERSON — NAME OF PERSON: PHILIP AMEYAW

Date: 29/01/2025

J&B GLOBAL LIFTING LTD. P.O Box 11549, Accra-North – Ghana. ll Email: sales@jbgloballifting.com ll Tel.:+233 209336718



Calibration certificate of tema crush machine (BS EN ISO 7500-1:2018 cer.no.LL11)



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PETROLEUM COMMISSION REGISTRATION PERMIT
License Number: PC/FIGC/0000224/A/04-18

Certificate No: 2025/01/009/PKBA/003 — TESTER/EXAMINER: PHILIP AMEYAW
Instrument Details — Equipment Owner: BETONSA

Serial Number:	17/000260
Model:	UTC-4331
Manufacture:	U TEST
Max. Capacity / Resolution	2000 kN / 1 kN
Temperature at time of test:	25±1°C
Place of Test:	Laboratory.
Date of Calibration Test:	26/01/2025
Next Due Calibration:	25/01/2026

Load Cell & Hand Held Display Details

Load Cell Serial Number:	33897
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Manufacture:	LCM SYSTEMS
Load Cell Range:	0 – 2000 kN
Hand Held Display Serial Number:	17319419
Type:	TR150
Resolution:	0.01 kN
Calibration documentation:	BS EN ISO 7500-1:2018
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Test Results
Unit zero full load
Linearity

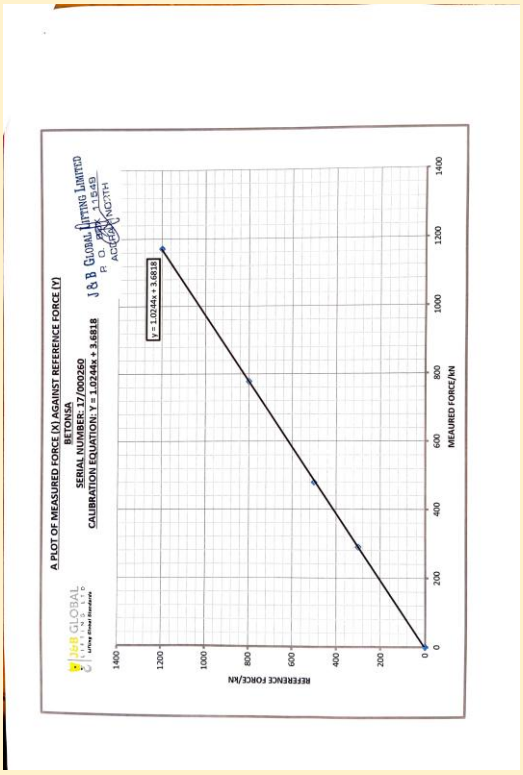
Reference Standard/ kN	Indicated Reading/ kN 1	Indicated Reading/ kN 2	Indicated Reading/ kN 3	Main Average Reading/ kN
0	0	0	0	0.000
300	295	295	295	295.000
500	489	490	490	489.667
800	779	780	780	779.667
1200	1169	1170	1169	1169.333

CALIBRATION EQUATION: Y = 1.0272x - 1.6173

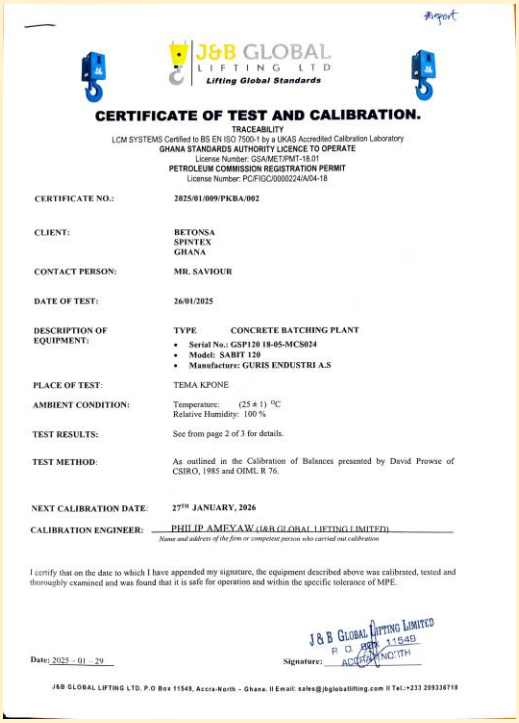
Name, position and qualification of person who carried out the calibration:
I certify on the behalf of the company or person name below that the items described herein were calibrated thereafter examined and were found to be within the acceptable tolerance limits as specified by the manufacturer and BS EN ISO 7500-1:2018

J&B GLOBAL LIFTING LIMITED P.O. Box 11549 ACCRA-NO:TH
SIGNATURE OF PERSON: — NAME OF PERSON: PHILIP AMEYAW
Date: 29/01 /2025

J&B GLOBAL LIFTING LTD. P.O Box 11549, Accra-North – Ghana. II Email: sales@jbglobalilifting.com II Tel.:+233 209336718



Calibration certificate of airport and tema plant (2025/0 1/009/PKBA/002)



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PETROLEUM COMMISSION REGISTRATION PERMIT
License Number: PC/FIGC/0000224/A/04-18

CERTIFICATE NO.: 2025/01/009/PKBA/002

CLIENT: BETONSA, SPINTEX, GHANA

CONTACT PERSON: MR. SAVIOUR

DATE OF TEST: 26/01/2025

DESCRIPTION OF EQUIPMENT: TYPE CONCRETE BATCHING PLANT
- Serial No.: GSP120 18-05-MCS024
- Model: SABIT 120
- Manufacture: GURIS ENDUSTRI A.S

PLACE OF TEST: TEMA KPONE

AMBIENT CONDITION: Temperature: (25 ± 1) °C, Relative Humidity: 100 %

TEST RESULTS: See from page 2 of 3 for details.

TEST METHOD: As outlined in the Calibration of Balances presented by David Prowse of CSIRO, 1985 and OIML R 76.

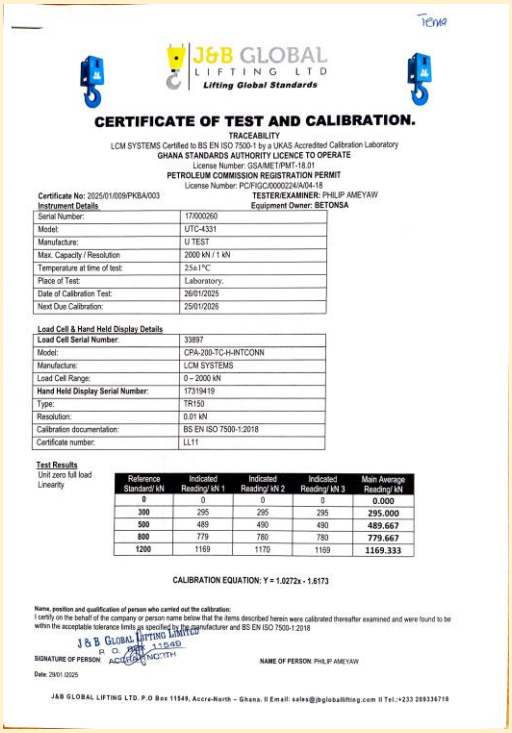
NEXT CALIBRATION DATE: 27TH JANUARY, 2026

CALIBRATION ENGINEER: PHILIP AMEYAW (J&B GLOBAL LIFTING LIMITED)
Name and address of the firm or competent person who carried out calibration

I certify that on the date to which I have appended my signature, the equipment described above was calibrated, tested and thoroughly examined and was found that it is safe for operation and within the specific tolerance of MPE.

J&B GLOBAL LIFTING LIMITED P.O. Box 11549 ACCRA-NO:TH
Date: 2025 – 01 – 29 Signature:

J&B GLOBAL LIFTING LTD. P.O Box 11549, Accra-North – Ghana. II Email: sales@jbglobalilifting.com II Tel.:+233 209336718



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Certificate No: 2025/01/009/PKBA/003 — TESTER/EXAMINER: PHILIP AMEYAW
Instrument Details — Equipment Owner: BETONSA

Serial Number:	17/000260
Model:	UTC-4331
Manufacture:	U TEST
Max. Capacity / Resolution	2000 kN / 1 kN
Temperature at time of test:	25±1°C
Place of Test:	Laboratory.
Date of Calibration Test:	26/01/2025
Next Due Calibration:	25/01/2026

Load Cell & Hand Held Display Details

Load Cell Serial Number:	33897
Model:	CPA-200-TC-H-INTCONN
Manufacture:	LCM SYSTEMS
Load Cell Range:	0 – 2000 kN
Hand Held Display Serial Number:	17319419
Type:	TR150
Resolution:	0.01 kN
Calibration documentation:	BS EN ISO 7500-1:2018
Certificate number:	LL11

Test Results
Unit zero full load
Linearity

Reference Standard/ kN	Indicated Reading/ kN 1	Indicated Reading/ kN 2	Indicated Reading/ kN 3	Main Average Reading/ kN
0	0	0	0	0.000
300	295	295	295	295.000
500	489	490	490	489.667
800	779	780	780	779.667
1200	1169	1170	1169	1169.333

CALIBRATION EQUATION: Y = 1.0272x - 1.6173

Name, position and qualification of person who carried out the calibration:
I certify on the behalf of the company or person name below that the items described herein were calibrated thereafter examined and were found to be within the acceptable tolerance limits as specified by the manufacturer and BS EN ISO 7500-1:2018

J&B GLOBAL LIFTING LIMITED P.O. Box 11549 ACCRA-NO:TH
SIGNATURE OF PERSON: — NAME OF PERSON: PHILIP AMEYAW
Date: 29/01 /2025

J&B GLOBAL LIFTING LTD. P.O Box 11549, Accra-North – Ghana. II Email: sales@jbglobalilifting.com II Tel.:+233 209336718

BETON GHANA LIMITED

Certificate of raw material analysis (BS EN 933-1:2012)

GHANA STANDARDS AUTHORITY
FORM

Page 1 of 3

TITLE: Analytical Test Report — **Doc. No. : GSA-FM-T09-F**

Your Ref:

Our Ref: GSA/ENG/1006/CEL2/2024

TO: THE TECHNICAL SUPPORT MANAGER
BETONSA GH. LTD
P.O BOX 20614, ADENTA, ACCRA

LABORATORY CONDUCTING TEST
Civil Engineering Laboratory
Shiashie (Legon-Madina Road)
Ghana Standards Authority
P. O. Box MB 245, Accra

Codes	
Generalized Product Code	.....BM.....
Specific Product Code	.....QD.....
Code of Reporting Officer	..... KN.....
Code of Approving Officer	..... MT.....
Period of Report	.....11/2024.....
Lab No. 1006 Lab. CEL Source Code 2 Yr. 2024	

NAME OF SAMPLE: QUARRY DUST **SAMPLE SIZE:** 50kg

DATE RECEIVED: 2024-10-02 **DATE(S) OF PERFORMANCE:** 2024-10-07 TO 2024-11-12

SOURCE / PURPOSE: BETONSA GH. LTD / Quality Evaluation

TEST CODE	TEST CONDUCTED	UNIT	RESULTS	TEST METHODS	SPECIFICATIONS BS EN 12620:2002+A1:2008 C33
GRA	Sieve Analysis		APPENDIX A	BS EN 933-1:2012	Over-all limits
CL	Clay Lumps	%	0.07	ASTM C142/C142M-17	1.00 (max.)
MGS	Magnesium Sulphate Soundness	%	7.00	BS EN 1367-2:2009	18 (max)
	Category	-	MS18		MS (18, 25, 35)
SUC	Sulphate Content	%	0.05	BS EN 1744-1:2001+A1:2010	0.20 (max.)
	Category	-	AS0.20		AS (0.20, 0.80)
CLC	Chloride Content	%	0.01	BS EN 1744-1:2001+A1:2010	Shall be declared

Lab No. 1006/CEL2/24

GHANA STANDARDS AUTHORITY
FORM

Page 2 of 3

TITLE: Analytical Test Report — **Doc. No. : GSA-FM-T09-F**

REMARKS: The test results indicate that the fine aggregate (quarry dust) is suitable for use in concrete as required in the Specification BS EN 12620:2002+A1:2008.

PRODUCT SAMPLED BY: Client.

SIGNATURE: ..... **SIGNATURE:** .....

REPORTED BY: Ing. K. Nyanful (PE-GhIE) **APPROVED BY:** Engr. M. K. Tsaku (F.PE.IET GH)

(Scientific Officer) (Head of Engineering Department)

DATE: 2024-11-12 **DATE:** 2024-11-12

Note: The result(s) relate only to the item tested

Conditions:

1. Not valid without Ghana Standards Authority's Seal.
2. This report does not signify that product tested has been certified.
3. Not to be used for litigation and advertisement without written consent of the Director General of Ghana Standards Authority.
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Lab No. 1006/CEL2/24

GHANA STANDARDS AUTHORITY
FORM

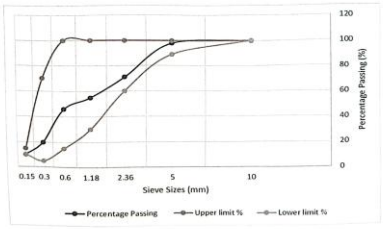
Page 3 of 3

TITLE: Analytical Test Report — **Doc. No. : GSA-FM-T09-F**

APPENDIX A

FINE AGGREGATES GRADING FOR OVERALL LIMITS

Sieve sizes	% Passing	Upper Limit	Lower Limit
10 mm	100	100	100
5 mm	98	100	89
2.36 mm	71	100	60
1.18 mm	55	100	30
600 mm	46	100	15
300 mm	20	70	5
150 mm	10	15	0



Lab No. 1006/CEL2/24

Page 1of 2

GHANA STANDARDS AUTHORITY
FORM

TITLE: Analytical Test Report — **Doc. No. GSA-FM-T09-F**

Your Ref.:

Our Ref.: GSA/ENG/543/CEL2/2024

TO: THE TECHNICAL SUPPORT MANAGER
BETONSA GH. LTD
ADENTA

Codes	
Generalized Product Code	BP.....
Specific Product Code	RM.....
Officer Responsible for Report	KN.....
Code of Approving Officer	DA.....
Period of Report	05/2024
Lab. No. 543 Lab. CEL Source Code 2 Yr. 2024	

LABORATORY CONDUCTING TEST
Civil Engineering Laboratory
Shiashie (Legon-Madina Road)
Ghana Standards Authority
P.O. Box MB 245, Accra

NAME OF SAMPLE: RIVER SAND **SAMPLE SIZE**: 10kg

DATE RECEIVED: 2024-05-21 **DATE(S) OF PERFORMANCE**: 2024-05-22 **TO** 2024-05-27

SOURCE/PURPOSE: BETONSA GH. LTD / QUALITY EVALUATION

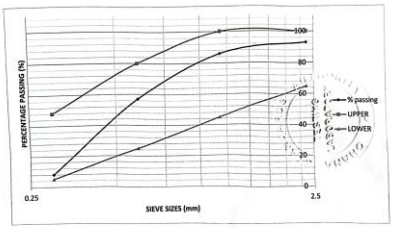
TEST CODE	TEST CONDUCTED	UNIT	RESULTS	TEST METHODS	SPECIFICATION BS EN 12620 : 2002 + A1 :2008 CS3
GRA	Sieve Analysis	-	APPENDIX A	BS EN 933-1:2012	M limits
	Fineness Modulus	-	2.59	BS EN 933-1:2012	MF (2.80 – 1.50)
PFC	Percent Fines Content	%	0.76	BS EN 933-1:2012	3.00 (max)
SCF	Silt, Clay and Fines content	%	1.10	BS EN 933-8:2012+A1:2015	-
SUC	Sulphate Content	%	Nil	BS EN 1744-1:2001+A1:2010	0.20 (max.)
	Category	-	$AS_{0.20}$		AS (0.20, 0.80)
CLC	Chloride Content	%	0.003	BS EN 1744-1:2001+A1:2010	Shall be declared

Lab No. 543/CEL2/2024

APPENDIX A

FINE AGGREGATE GRADING FOR M LIMITS FOR RIVER SAND.

Sieve sizes	% Passing	UPPER LIMIT	LOWER LIMIT
2.36 mm	93	100	65
1.18 mm	86	100	45
600 µm	57	80	25
300 µm	8	48	5



Lab No. 543/CEL2/2024

Page 2 of 2

GHANA STANDARDS AUTHORITY
FORM

TITLE: Analytical Test Report — **Doc. No. GSA-FM-T09-F**

REMARKS: The test results indicate that the fine aggregate is suitable for use in concrete as required in the Specification **BS EN 12620:2002+A1:2008.**

PRODUCT SAMPLED BY: CLIENT

SIGNATURE ..... **SIGNATURE** .....

REPORTED BY: Ing. K. Nyanful (PE-GhIE) **APPROVED BY:** Ing. D. V. Arthur (SPE-GhIE)

(Scientific Officer) (Head of Engineering Department)

DATE: 2024-05-27 **DATE:** 2024-05-27

Note: **The results relate only to the items tested**

Conditions:

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2. This report does not signify that product tested has been certified.
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Lab No. 543/CEL2/2024

BETON
GHANA LIMITED

GHANA STANDARDS AUTHORITY
FORM
Page 1 of 4

TITLE: Analytical Test Report **Doc. No. : GSA-FM-T09-F**

Your Ref:

Our Ref: GSA/ENG/1004/CEL2/2024

TO: THE TECHNICAL SUPPORT MANAGER
BETONSA GH. LTD
P.O BOX 20614, ADENTA, ACCRA

Codes

Generalized Product Code	.....BM.....
Specific Product Code	.....QD.....
Code of Reporting Officer	..... KN.....
Code of Approving Officer	..... MT.....
Period of Report	.....11/2024.....

Lab No. 1004 Lab. CEL Source Code 2 Yr. 2024

LABORATORY CONDUCTING TEST
Civil Engineering Laboratory
Shiashie (Legon-Madina Road)
Ghana Standards Authority
P. O. Box MB 245, Accra

NAME OF SAMPLE: COARSE AGGREGATE – 10-14mm **SAMPLE SIZE:** 50kg
DATE RECEIVED: 2024-10-02 **DATE(S) OF PERFORMANCE:** 2024-10-07 TO 2024-11-12
SOURCE / PURPOSE: BETONSA GH. LTD / Quality Evaluation

TEST CODE	TEST CONDUCTED	UNIT	RESULTS	TEST METHODS	SPECIFICATIONS BS EN 12620:2002+A1:2008 C33
GRA	Sieve Analysis	-	APPENDIX A	BS EN 933-1:2012	14 mm single sized
FIV	Flakiness Index Category	-	17 FI20	BS EN 933-3:2012	20 (max) FI (15, 20, 35)
LAV	Los Angeles Abrasion Value Category	% -	22 LA25	BS EN 1097-2:1998	25 (max) LA (15, 20, 25)
MSS	Magnesium Soundness Category	% -	10.00 MS18	BS EN 1367-2:2009	18 (max) MS (18, 25, 35)
SUC	Sulphate Content Category	% -	0.02 AS0.2	BS EN 1744-1:2001+A1:2010	0.20 (max) AS (0.20, 0.80)
CLC	Chloride Content	%	0.00	BS EN 1744-1:2001+A1:2010	Shall be declared

Lab No. 1004/CEL2/24

GHANA STANDARDS AUTHORITY
FORM
Page 2 of 4

TITLE: Analytical Test Report **Doc. No. : GSA-FM-T09-F**

ASR	Alkaline Silica Reactivity Reduction in Alkalinity	mmol/L	64	ASTM C289-03	Shall be declared
	Dissolved Silica	mmol/L	25	ASTM C289-03	Shall be declared
SGV	Specific Gravity	-	2.71	BS 812-2:1995	Shall be declared

Lab No. 1004/CEL2/24

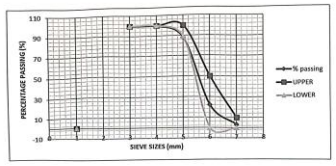
GHANA STANDARDS AUTHORITY
FORM
Page 4 of 4

TITLE: Analytical Test Report **Doc. No. : GSA-FM-T09-F**

APPENDIX A

COARSE AGGREGATES GRADING FOR 14 MM SINGLE SIZES

Sieve sizes	% Passing	Upper Limit	Lower Limit
20 mm	100	100	100
14 mm	88	100	89
10 mm	22	50	0
5 mm	3	10	0



Lab No. 1004/CEL2/24

GHANA STANDARDS AUTHORITY
FORM
Page 3 of 4

TITLE: Analytical Test Report **Doc. No. : GSA-FM-T09-F**

REMARKS: The test results indicate that the coarse aggregate is suitable for use in concrete as required in the Specification **BS EN 12620:2002+A1:2008**

PRODUCT SAMPLED BY: Client.

SIGNATURE: .....
REPORTED BY: Ing. K. Nyanful (PE-GhIE)
(Scientific Officer)
DATE: 2024-11-12

SIGNATURE: .....
APPROVED BY: Engr. M. K. Tsaku (F.PE.IET GH)
(Head of Engineering Department)
DATE: 2024-11-12

Note: The result(s) relate only to the item tested

Conditions:

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Lab No. 1004/CEL2/24

GHANA STANDARDS AUTHORITY
FORM
Page 2 of 4

TITLE: Analytical Test Report **Doc. No. : GSA-FM-T09-F**

ASR	Alkaline Silica Reactivity Reduction in Alkalinity	mmol/L	76	ASTM C289-03	Shall be declared
	Dissolved Silica	mmol/L	29	ASTM C289-03	Shall be declared
SGV	Specific Gravity	-	2.70	BS 812-2:1995	Shall be declared

Lab No. 1005/CEL2/24

GHANA STANDARDS AUTHORITY
FORM
Page 1 of 4

TITLE: Analytical Test Report **Doc. No. : GSA-FM-T09-F**

Your Ref:

Our Ref: GSA/ENG/1005/CEL2/2024

TO: THE TECHNICAL SUPPORT MANAGER
BETONSA GH. LTD
P.O BOX 20614, ADENTA, ACCRA

Codes

Generalized Product Code	.....BM.....
Specific Product Code	.....QD.....
Code of Reporting Officer	..... KN.....
Code of Approving Officer	..... MT.....
Period of Report	.....11/2024.....

Lab No. 1005 Lab. CEL Source Code 2 Yr. 2024

LABORATORY CONDUCTING TEST
Civil Engineering Laboratory
Shiashie (Legon-Madina Road)
Ghana Standards Authority
P. O. Box MB 245, Accra

NAME OF SAMPLE: COARSE AGGREGATE – 14-20mm **SAMPLE SIZE:** 50kg
DATE RECEIVED: 2024-10-02 **DATE(S) OF PERFORMANCE:** 2024-10-07 TO 2024-11-12
SOURCE / PURPOSE: BETONSA GH. LTD / Quality Evaluation

TEST CODE	TEST CONDUCTED	UNIT	RESULTS	TEST METHODS	SPECIFICATIONS BS EN 12620:2002+A1:2008 C33
GRA	Sieve Analysis	-	APPENDIX A	BS EN 933-1:2012	14 mm single sized
FIV	Flakiness Index Category	-	19 FI20	BS EN 933-3:2012	20 (max) FI (15, 20, 35)
LAV	Los Angeles Abrasion Value Category	% -	21 LA25	BS EN 1097-2:1998	25 (max) LA (15, 20, 25)
MSS	Magnesium Soundness Category	% -	9.00 MS18	BS EN 1367-2:2009	18 (max) MS (18, 25, 35)
SUC	Sulphate Content Category	% -	0.01 AS0.2	BS EN 1744-1:2001+A1:2010	0.20 (max) AS (0.20, 0.80)
CLC	Chloride Content	%	0.00	BS EN 1744-1:2001+A1:2010	Shall be declared

Lab No. 1005/CEL2/24

BETON GHANA LIMITED

GHANA STANDARDS AUTHORITY
FORM

Page 3 of 4

TITLE: Analytical Test Report Doc. No. : GSA-FM-T09-F

REMARKS: The test results indicate that the coarse aggregate is suitable for use in concrete as required in the Specification **BS EN 12620:2002+A1:2008**

PRODUCT SAMPLED BY: Client.

SIGNATURE: ..... **SIGNATURE:** .....

REPORTED BY: Ing. K. Nyanful (PE-GhIE) **APPROVED BY:** Engr. M. K. Tsaku (F.PE.IET GH)

(Scientific Officer) (Head of Engineering Department)

DATE: 2024-11-12 **DATE:** 2024-11-12

Note: The result(s) relate only to the item tested

Conditions:

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Lab No. 1005/CEL2/24

GHANA STANDARDS AUTHORITY
FORM

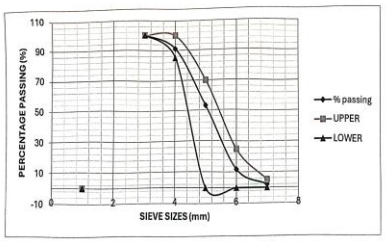
Page 4 of 4

TITLE: Analytical Test Report Doc. No. : GSA-FM-T09-F

APPENDIX A

COARSE AGGREGATES GRADING FOR 20 MM SINGLE SIZES

Sieve sizes	% Passing	Upper Limit	Lower Limit
37.5 mm	100	100	100
20 mm	91	100	85
14 mm	53	70	0
10 mm	12	25	0
5 mm	2	5	0



Lab No. 1005/CEL2/24