

CBA®

Quality/Strength Enhancing Additive

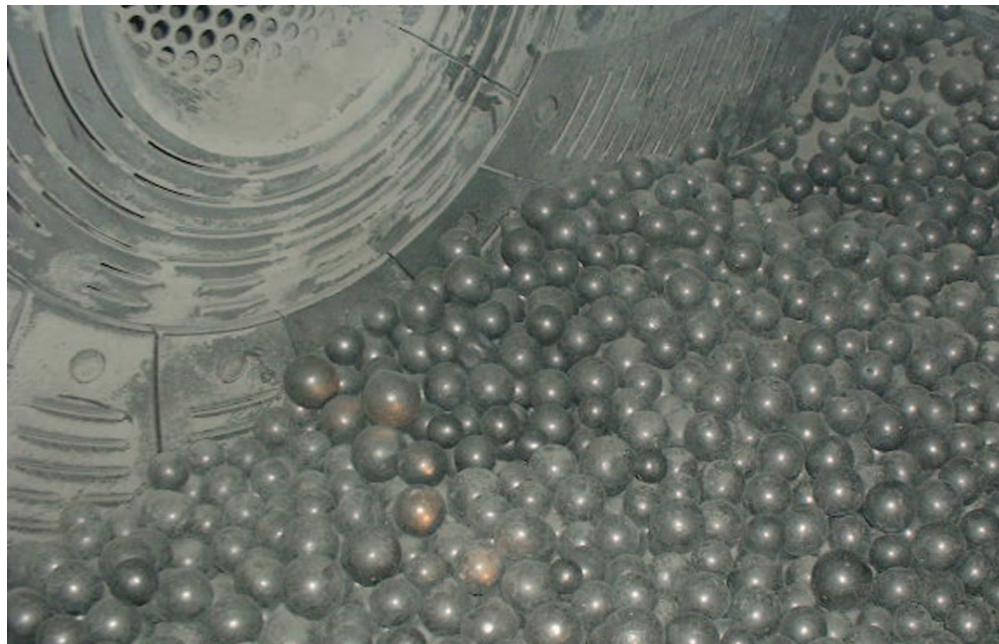
Description

The CBA® series of additives is a new concept in grinding aids – significantly different from any previous Grace product for the cement industry. The difference is that it is a “Grinding Aid Plus”. CBA additives offer all the benefits of traditional grinding aids, such as increased grinding efficiency and cement flowability. In addition, they offer a unique ability to improve cement strengths which might otherwise be deficient due to mechanical, physical or chemical shortcomings. Advantages include either reduced cost of production or increased cement strengths.

Product specifications for the most widely used CBA formulations are as follows:

	S.G.	pH
CBA 1102	1.06 (±0.01)	7 - 9
CBA 1104	1.07 (±0.01)	8 - 12
CBA 1115	1.10 (±0.01)	6 - 8

Specifications for other CBA formulations not shown above are available through Grace Construction Products Field Engineers.



Primary Benefit

The CBA series of additives consists of tailor-made formulations to optimize performance and meet specific requirements at each plant.

The use of CBA allows the cement producer to reduce fineness and achieve lower unit power costs without sacrificing strength. Compared with conventional grinding aids, CBA offers unit power savings of up to 25% with no loss of strength. And the resulting production increases can greatly benefit plants operating at or near their grinding capacity.

Advantages

The chemical action of CBA additives decreases the interparticle attraction between cement grains and increases the rate of hydration of cements. The key advantages of CBA additives include:

- Increased grinding efficiency with resulting increased mill output, higher cement fineness and/or reduced unit power input and grinding costs.
- Increased workability (flow) of cement mortars and concretes.

- Increased cement flowability and reduced pack set or “silo set” of cements resulting in lower handling costs and reduced waste.
- Increased early and long-term compressive strengths for production of better quality cements.
- Reduced cost of cement production through reduced unit grinding costs and through replacement of clinker with reactive additions such as pozzolans, blast furnace slag and fly ash or with fillers such as limestone.

CBA additives are most effective in enhancing compressive strengths of blended cements using up to 40% limestone filler.

When cement particle size is not reduced, the addition of CBA improves both early and long-term strength and produces higher quality cement.

Strength increases ranging from 5% to 50% have been demonstrated during plant trials.

Applications of CBA

Laboratory mill evaluations of clinker and other additions are recommended to determine initial blend proportions, grinding efficiency, pack set index, mortar flow, compressive strengths of cements etc. and to enable Grace to formulate the most effective CBA product for each condition.

Handling

CBA additives are sprayed into the mill’s first compartment or added onto the clinker conveyor belt. Suitable dispensing pumps with adjustable flow rates should be used for accurate dosing and for optimum performance.

Typical Performance Data CBA 1104						
Objectives	A) Replacement of 10% Clinker by Limestone (Laboratory Test)			B) Increase Strengths at same Limestone Content (Plant Test)		
	Blank	CBA 1104	CBA 1104	Blank	CBA 1104	CBA 1104
Cement Composition:						
Clinker	65%	60%	55%	72%	71%	72%
Gypsum	5%	5%	5%	4%	5%	5%
Limestone	30%	35%	40%	24%	24%	23%
CBA Dosage	–	0.06%	0.06%	–	0.02%	0.04%
Mill Revolutions	2700	2700	2600	–	–	–
Mill Production (t/h)	–	–	–	37.3	36.0	37.6
Power Input (kWh/t)	–	–	–	28.1	28.8	28.1
Blaine (cm ² /g)	4070	3950	3980	4380	4410	4160
Residues 40 µm	24.5%	14.1%	14.7%	27.0%	17.5%	12.8%
Flow (mm)	111	108	105	114	113	112
Compressive Strength: (MPa)						
1 Day	2.8	3.6	3.1	5.6	8.4	10.5
3 Days	8.7	10.8	9.7	13.4	18.8	19.2
7 Days	12.3	15.8	15.1	18.1	23.5	24.0
28 Days	18.4	23.5	21.8	22.6	27.4	29.3

Typical Performance Data CBA 1115				
Objective	Compare the efficiency of CBA against competitive product (Plant Test)			
	Product xyz	CBA 1115	Product xyz	CBA 1115
Additive				
Cement Composition:				
Clinker	86%	86%	86%	86%
Gypsum	5%	5%	5%	5%
Limestone	9%	9%	9%	9%
Additive Dosage	0.20%	0.04%	0.18%	0.04%
Cement Mill #	3	3	4	4
Mill Production (t/h)	13.1	17.2	21.2	28.8
Power Input (kWh/t)	62.8	47.7	38.7	28.5
Blaine (cm ² /g)	4200	3950	3530	3160
Residues 40 µm	7.0	3.4	15.3	12.0
Mortar				
Compressive Strength: (MPa)				
1 Day	18.3	18.1	12.5	11.5
3 Days	31.2	33.1	26.9	28.2
7 Days	38.8	44.6	34.1	38.2
28 Days	49.1	57.4	45.8	51.7
Concrete				
W/C	0.60	0.56	0.62	0.59
Slump (cm)	16	16	17	17
Compressive Strength: (MPa)				
1 Day	9.9	10.2	8.4	8.2
3 Days	–	–	–	–
7 Days	26.2	29.4	22.0	25.7
28 Days	32.9	39.1	29.0	32.3

Addition Rates

CBA addition rates of 0.02% to 0.06% by mass of cement are recommended.

The optimum addition rate of CBA should be determined in laboratory and cement mill tests.

Dosing Equipment

Grace grinding aids should be accurately proportioned through a calibrated dosing system, suitable for the cement mill and output required.

Grace can advise on all types of equipment suitable for installation, including manual, semi-automatic, automatic and computerized systems.

Compatibility

CBA additives, and cements treated with CBA, are compatible in concrete with all commercial admixtures such as air entrainers, water reducers, retarders and superplasticizers. The performance of concrete admixtures and the physical properties of concretes are not adversely affected by the use of CBA in cement production.

Packaging

CBA is supplied in 210 L (55 gal) drums. CBA may also be supplied in bulk in certain locations. It contains no flammable materials.

Storage

Protect from freezing. Once frozen, the product should be thawed out slowly and re-mixed thoroughly prior to use. Shelf life is minimum 12 months in manufacturer's containers.

Technical Services

Field Engineers from Grace Construction Products are available to assist in laboratory and mill test evaluations of CBA. Complete testing equipment and methods for analyzing mill performance are also available during plant trials.



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This product is covered by U.S. Patent No. 4,943,323 and E.U. Patent No. 0,415,799.
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