

OPTEVA[®] CBA[®]

Quality/strength-enhancing additive

Product Description

The OPTEVA[®] CBA[®] series of additives is a new concept in grinding aids – significantly different from any previous GCP product for the cement industry. The difference is that it is a “Grinding Aid Plus”. OPTEVA[®] 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.

Advantages

The chemical action of OPTEVA[®] CBA[®] additives decreases the interparticle attraction between cement grains and increases the rate of hydration of cements. The key advantages of OPTEVA[®] 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.
- OPTEVA[®] 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 OPTEVA[®] 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.

Physical Properties

Product specifications for the most widely used OPTEVA[®] CBA[®] formulations are as follows:

	S.G.	PH
OPTEVA [®] CBA [®] 1102	1.06 (±0.01)	7 – 9
OPTEVA [®] CBA [®] 1104	1.07 (±0.01)	8 – 12
OPTEVA [®] CBA [®] 1115	1.10 (±0.01)	6 – 8

Specifications for other OPTEVA[®] CBA[®] formulations not shown above are available through GCP Applied Technologies Field Engineers.

Primary Benefit

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

The use of OPTEVA® CBA® allows the cement producer to reduce fineness and achieve lower unit power costs without sacrificing strength. Compared with conventional grinding aids, OPTEVA® 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.

Applications

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 GCP to formulate the most effective OPTEVA® CBA® product for each condition.

Compatibility

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

Addition Rate

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

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

Table Performance Data OPTEVA® CBA® 1104

Objective A: Replacement of 10% Clinker by Limestone (Laboratory Test)

Objectives	A) Replacement of 10% Clinker by Limestone (Laboratory Test)		
Additive	Blank	OPTEVA® CBA® 1104	OPTEVA® CBA® 1104
Cement Composition:			
Clinker	65%	60%	55%
Gypsum	5%	5%	5%
Limestone	30%	35%	40%
OPTEVA® CBA® Dosage	-	0.06%	0.06%
Mill Revolutions	2700	2700	2600
Mill Production (t/h)	-	-	-
Power Input (kWh/t)	-	-	-
Blaine (cm ² /g)	4070	3950	3980
Residues 40 µm	24.5%	14.1%	14.7%
Flow (mm)	111	108	105
Compressive Strength (MPa):			
1 Day	2.8	3.6	3.1
3 Day	8.7	10.8	9.7
7 Day	12.3	15.8	15.1
28 Day	18.4	23.5	21.8

Objectives	B) Increase Strengths at same Limestone Content (Plant Test)		
Additive	Blank	OPTEVA® CBA® 1104	OPTEVA® CBA® 1104
Cement Composition:			
Clinker	72%	71%	72%
Gypsum	4%	5%	5%
Limestone	24%	24%	23%
OPTEVA® CBA® Dosage	-	0.02%	0.04%
Mill Revolutions	-	-	-
Mill Production (t/h)	37.3	36.0	37.6
Power Input (kWh/t)	28.1	28.8	28.1
Blaine (cm ² /g)	4380	4410	4160

Residues 40 µm	27.0%	17.5%	12.8%
Flow (mm)	114	113	112
Compressive Strength (MPa):			
1 Day	5.6	8.4	10.5
3 Day	13.4	18.8	19.2
7 Day	18.1	23.5	24.0
28 Day	22.6	27.4	29.3

Typical Performance Data OPTEVA[®] CBA[®] 1115

Objectives	Compare the efficiency of OPTEVA [®] CBA [®] against competitive product (Plant Test)			
Additive	Product xyz	OPTEVA [®] CBA [®] 1115	Product xyz	OPTEVA [®] CBA [®] 1115
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 Day	31.2	33.1	26.9	28.2
7 Day	38.8	44.6	34.1	38.2
28 Day	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 Day	-	-	-	-
7 Day	26.2	29.4	22.0	25.7
28 Day	32.9	39.1	29.0	32.3

Handling

OPTEVA® 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.

Dosing Equipment

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

GCP can advise on all types of equipment suitable for installation, including manual, semiautomatic, automatic and computerised systems.

Packaging

OPTEVA® CBA® is supplied in 210L drums. OPTEVA® 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 GCP Applied Technologies are available to assist in laboratory and mill test evaluations of OPTEVA® CBA®. Complete testing equipment and methods for analysing mill performance are also available during plant trials.

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