



CONFORMITY CERTIFICATE					
Ground Granulated Blastfurnace Slag Produced at		Aboño		Works	
Sample Period		November 2019			
<b>Certificate of Conformity of GGBS to EN 15167-1:2006</b>			<b>Certificate of Conformity of Combinations of GGBS and CEM I Portland Cement to Annex A of BS 8500-2:2015</b>		
Spot samples of GGBS were taken and tested to determine conformity to the autocontrol requirements of EN 15167-1:2006 "Ground granulated blastfurnace slag for use in concrete, mortar and grout" following the methods given in that standard. The values reported are mean values for the monthly production period.			Portland Cement Source:		
Aboño GGBS Only			<b>Secil</b>		
For combinations of GGBS supplied from the above works with the above CEM I Portland cement the permitted proportions conforming to the requirements given in annex A of BS 8500-2:2015 are:					
Results	Product	EN Limit	Strength Class	Not Less Than**	Not More Than**
Fineness m <sup>2</sup> /kg	488	min. 275	52.5L	6	43
Magnesium Oxide MgO %	8	max. 18	42.5L	6	68
Sulfate SO <sub>3</sub> %	0.1	max. 2.5	32.5L	56	80
Sulfide S <sup>2-</sup> %	0.6	max. 2.0	Conformity Evaluation Period (if less than 6 months)	N/A	month(s)
Chloride Content Cl <sup>-</sup> %	0.02	max. 0.10	Combination Designation (Table 1 BS 8500-2:2015)		
Moisture Content %	0.1	max. 1.0	CIIA-S	6	20
Corrected Loss on Ignition %	1.4	max. 3.0	CIIB-S	21	35
Aluminium Oxide Al <sub>2</sub> O <sub>3</sub> %	12.4	to 1 d.p.	CIIIA	36	65
Note: If the value of Al <sub>2</sub> O <sub>3</sub> is ≥ 14.5% the '+SR' restriction will be exceeded if the C <sub>3</sub> A of the CEM I is >10%.			CIIBB	66	80
<i>Alkalis as Na<sub>2</sub>O equ. (acid soluble)</i>			** % GGBS		
Guaranteed Alkali limit %	≤ 1.0		<i>Results of tests in accordance with BS EN 196-1 for 50% GGBS in combination with 50% CEM I Portland cement shown above</i>		
Certified Average Alkali ( Last 25 ) %	0.57		Age	7 Days	28 Days
Declared Mean : Mean last 25 + ( SD last 25 x 1.64 ) %	0.58		Compressive Strength N/mm <sup>2</sup>	32.0	52.8
COMBINATION OF 50% LABORATORY STOCK CEM I PORTLAND CEMENT AND 50% GGBS			<i>The samples of LKAB Minerals GGBS and the CEM I Portland cement were bulk average monthly samples for the works specified</i>		
Initial Setting Time min	230	not > than 2 x PC			
Activity Index %	7 days	62	<b>0099/CPR/B34/0001</b>		
	28 days	95			
LABORATORY STOCK CEM I PORTLAND CEMENT ONLY					
<i>The stock CEM I Portland cement used in these tests was supplied by CEMENTOS TUDELA VEGUIN, S.A and the following results were obtained from that sample</i>					
Initial Setting Time min	190				
Compressive Strength N/mm <sup>2</sup>	7 days	50.6			
	28 days	57.7			
The GGBS contained no additional materials other than those permitted. The above results and other tests demonstrate the conformity of the material sold during the month to the requirements of EN 15167-1:2006.					
LKAB Minerals Ltd are acting as a dispatching centre in the distribution of the above GGBS and further details and certification are available on request.					

Signed:

L Bontoft - Technical Manager GGBS