



## HKP-GGBS - from raw GBS

*nanostructured ground granulated blastfurnace slag*  
highly reactive ☀ CO<sub>2</sub>-low ☀ super activated  
**energy consumption - ref. MB**  
*(additional full cost, CM20-CM900, Germany 2018-06)*



### Innovation

In order to enhance the properties of Ground Granulated Blastfurnace Slag (GGBS) for construction purpose, Granulated Blastfurnace Slag (GBS) was treated by High-Kinetic-Processing (HKP). Depending on processing mode and process parameter, GBS was transformed to HKP-GGBS by obtaining suitable values for particle-size reduction and activation simultaneously.

### Process

GBS - out of the box - was not pre-treated except sieving to (a) <1,5 and (b) <5mm (operation mode). The smaller fraction utilized for processing in semi-continuous mode by Simoloyer® CM20-s1, the larger fraction for batch processing using CM20 and CM100. Particle reduction and activation of HKP-GGBS after HKP was analyzed by customer. Most successfully evaluated results were ID 4, 7, 12, 16, 23 (total no. of tests: 24):



### Energy consumption:

B	C	D	F	K	L	M <sup>*)</sup>	N	O	P	Q	R
#	test ID	Simoloyer®	GBS [kg]	disch. [rpm]	disch. [min]	handl. [min]	prod. [kg/h]	[kW]	[kWh/t]	[€/t]	prop. for concr. [€/t]
4	V702-2a	CM20 ba.	2,00	400	1,5	4	14,1	5	187,5	28,1	1,41
7	V702-3a	CM20 ba.	2,00	400	2,5	4	5,6	5	729,2	109,4	5,47
12	V701-05-500-vS	CM20 co.	(50% feed)	-	-	1,25	43,06	5	116,1	17,4	0,87
16	V701-10	CM20 co.	(75% feed)	-	-	1,25	71,71	8,4	117,1	17,6	0,88
23	V703-04	CM100 ba.	10,00	325+400	3,5	8	46,2	39,2	326,7	49,0	2,45

abbreviations: ba. = batch | co. = semi-continuous | disch. = discharging | handl. = handling | prod. = productivity | prop. = proportionate | feed = screw-feeding | concr. = concrete | PSD = particle size distribution

explanations: productivity results of column F, processing time, M and L. Power consumption measured by Maltoz®. Energy consumption for screw-feeder (≈0,5kWh) and side channel turbine not considered

handling time: (M\*) standard average data, not particularly measured

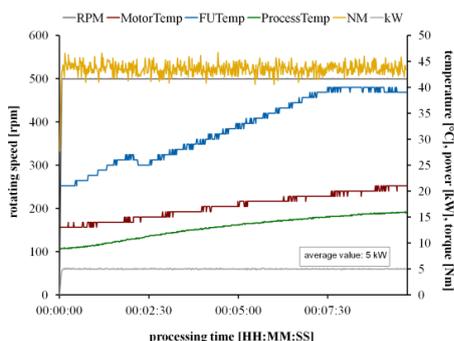
### process parameter:

load ratio: ~ 40 vol.% vessel  
grinding-media: CM20: 25kg | CM100: 125kg || each ø5mm, 100Cr6  
operation mode: carrier-gas/solid separation in semi-continuous mode by cyclone  
electric rate: 0,15 EUR/kWh (set for large-scale consumer)  
in concrete: 5,00% HKP-GGBS proportionate in concrete

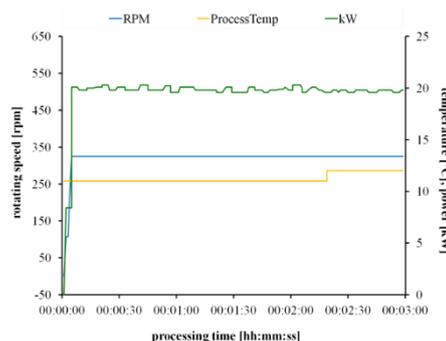


GBS samples

highest operational capacity at **V701-10** with satisfying PSD/reactivity and second-lowest energy-cost. Highest performance of HKP-GGBS at **V702-03a**.



CM20-s1 (semi-continuous)



CM100b (batch-processing)



ZCS balustrade, Siegen, 21.06.2013