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ADDITIVES FOR THE INCREASE OF THE BREAKING LOAD “IN GREEN AND DRIED”

The use of additives capable of elevating the BREAKING MODULE in raw of the ceramic mixtures is a constant research in evolution.

The products commonly used are the cellulose with its derivatives, the starches and the classic ligninsulphonates.

However, the use of these natural polymers should be limited, as they bring carbon which contributes, during firing, to the formation of the black core defect.

In addition to the problem of the black core, which may require corrections of the firing cycles, the use of these products causes interference on other aspects of the production cycle, such as:

- Difficulty dispersing the additive with the mixture
- Attachment of the powder to the walls of the spray-drier
- Attachment of the spray-dried product in the resting silos
- Increase of the mould dirty during the forming phase
- Defects on the surfaces of the glazed products
- Environmental impact



To overcome these problems, Mistral Italia prefers offer to its customers ADDITIVES BASED ON ORGANIC POLYMERS, carbon-free.

In case you want to increase the flexural strength of the green product, we offer **PLASTICIZING additives**, while the **BINDERS** are suggested in case you want to optimize the characteristics of the dried product.

The choice to use a type of plasticizer or binder always requires the execution of a screening performed with the customer's raw materials and the results depend very much on the “bonds” that the additive undertakes with the components/minerals of the mixture.

This behavior leads **Mistral Italia** to claim that each mixture composition requires its own specific additive. **Mistral Italia**, through careful technological tests carried out in its laboratories, therefore has the opportunity to offer the best product to the specific needs of customers.



As an example, we report a typical technological study carried out in the Mistral Italia laboratories. The results achieved on traditional mixtures are reported, with the use of various additives produced by Mistral Italia.

LOADS IN GREEN

MIXTURE 1

STD			Mistral 1,5% Plasticizer		
Test piece module already broken in half			Test piece module already broken in half		
10.5	10	10.20	12.20	11.90	11.80
10.8	9.9	10.60	12.80	12.50	12.30
10.4	10.2	9.90	12.60	12.40	12.00
10.7	10.5	10.10	12.80	12.40	12.00
10.8	10.2	10.00	12.60	12.00	11.90
AVERAGE	10.64	10.32	12.60		12.28
% INCREASE			18.42		18.99

MIXTURE 2

STD			Mistral 1,5% Plasticizer		
Test piece module already broken in half			Test piece module already broken in half		
4.5	4	3.90	5.30	5.00	4.90
4.3	4.2	3.80	5.20	5.20	5.00
4	3.8	4.00	5.50	4.80	5.00
4.1	4	3.90	5.00	5.30	4.90
4.2	4	3.80	5.00	4.80	4.80
AVERAGE	4.22	4.03	5.20		5.05
% INCREASE			23.22		25.12

LOADS IN DRIED

MIXTURE 1

STD				Test piece module already broken in half	
weight_t0	weight_t1	HUMIDITY	MODULE		
68.22	63.27	7.26	33.70	30.70	30.60
67.70	62.78	7.27	30.10	29.70	30.40
67.13	62.29	7.21	33.30	28.50	30.80
68.20	63.24	7.27	32.00	30.20	29.70
AVERAGE		7.24	32.28		30.81

Mistral 0,3% Binder				Test piece module already broken in half	
weight_t0	weight_t1	HUMIDITY	MODULE		
67.01	62.15	7.25	42.80	41.00	39.80
65.26	60.54	7.23	43.40	40.10	38.70
65.77	61.00	7.25	40.90	40.20	39.90
68.05	63.13	7.23	42.60	41.30	38.80
AVERAGE		7.25	42.43		40.79
% INCREASE			31.45		32.40

MIXTURE 2

STD				Test piece module already broken in half	
weight_t0	weight_t1	HUMIDITY	MODULE		
70.57	65.84	6.70	22.30	21.20	20.40
68.70	64.05	6.77	21.00	20.80	19.90
69.89	65.18	6.74	21.70	20.30	21.00
69.75	65.06	6.72	21.30	20.80	20.50
70.52	65.75	6.76	22.80	21.80	20.70
AVERAGE		6.74	21.82		21.10

Mistral 0,3% Binder				Test piece module already broken in half	
weight_t0	weight_t1	HUMIDITY	MODULE		
70.60	65.89	6.67	33.90	32.50	30.90
70.85	66.04	6.79	34.20	32.20	31.80
72.45	67.52	6.80	34.20	32.60	30.30
70.82	66.08	6.69	34.40	33.40	31.80
70.42	65.60	6.84	33.70	30.40	30.60
AVERAGE		6.76	34.08		32.46
% INCREASE			56.19		53.84

Large formats-slabs

The creation of large formats requires the use of ceramic compositions with more performing technological characteristics than "traditional formulas". The critical issues that a technologist must solve in order to make a mixture suitable for these formats are those of obtaining a mass which has both good raw resistance values and resistance to deformation during firing. The research is therefore mainly focused on the identification of the most suitable raw materials and of course on ceramic additives to correct and/or make the product more performing.

In this regard, **Mistral Italia** has developed a series of additives to improve the technological characteristics of the mixtures, also trying to simplify and facilitate their use in the manufacturing process. So, the peculiarity of these products is of being able to optimize the technological characteristics of the mixture, without interfering with other aspects of the process such as:

- Homogenization, as the additive disperses well with the mixture
- Minimum interference on the rheological behavior of the slip
- Formulate the mixture with raw materials with a lower content of organic substances
- Management of the values of mechanical strength in raw and therefore less breakage/waste in production
- Absence of contaminating elements such as Carbon and Sulfur and therefore better management of firing and black core
- No influence on the color of the final product and on the pyro-plastic deformation of the product during firing
- Low environmental impact.



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