COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM SYSTEM

SUBJECT OF THE STUDY: RETARDANTS IN THE HEMIHYDRATE GYPSUM SYSTEM

The aim of the study is to analyze the performance of different types of retarders in the hemihydrate gypsum system.

The retarding values in the hemihydrate gypsum system, as illustrated in the data below, are fundamental as they guarantee the stability and homogeneity of the products.

The setting speed and the hardening process of the formulation can be adjusted by adding a retarder, guaranteeing the construction worker the time necessary to apply the product and obtaining a result with greater adhesion and final resistance.

The study was carried out to illustrate the performance of the retarder introduced into the hemihydrate gypsum system excluding other interactions that can be found in a typical formulation (e.g. lime, cellulose or resins).
In this way we were able to examine the performance of the retarders at the same dosage and also the possible combinations with the various retarders.

The results of the study demonstrate that increasing the dosage of Power retard proportionally increases the delay on chalk and that Power Retard has good adaptability with citric acid and tartaric acid.

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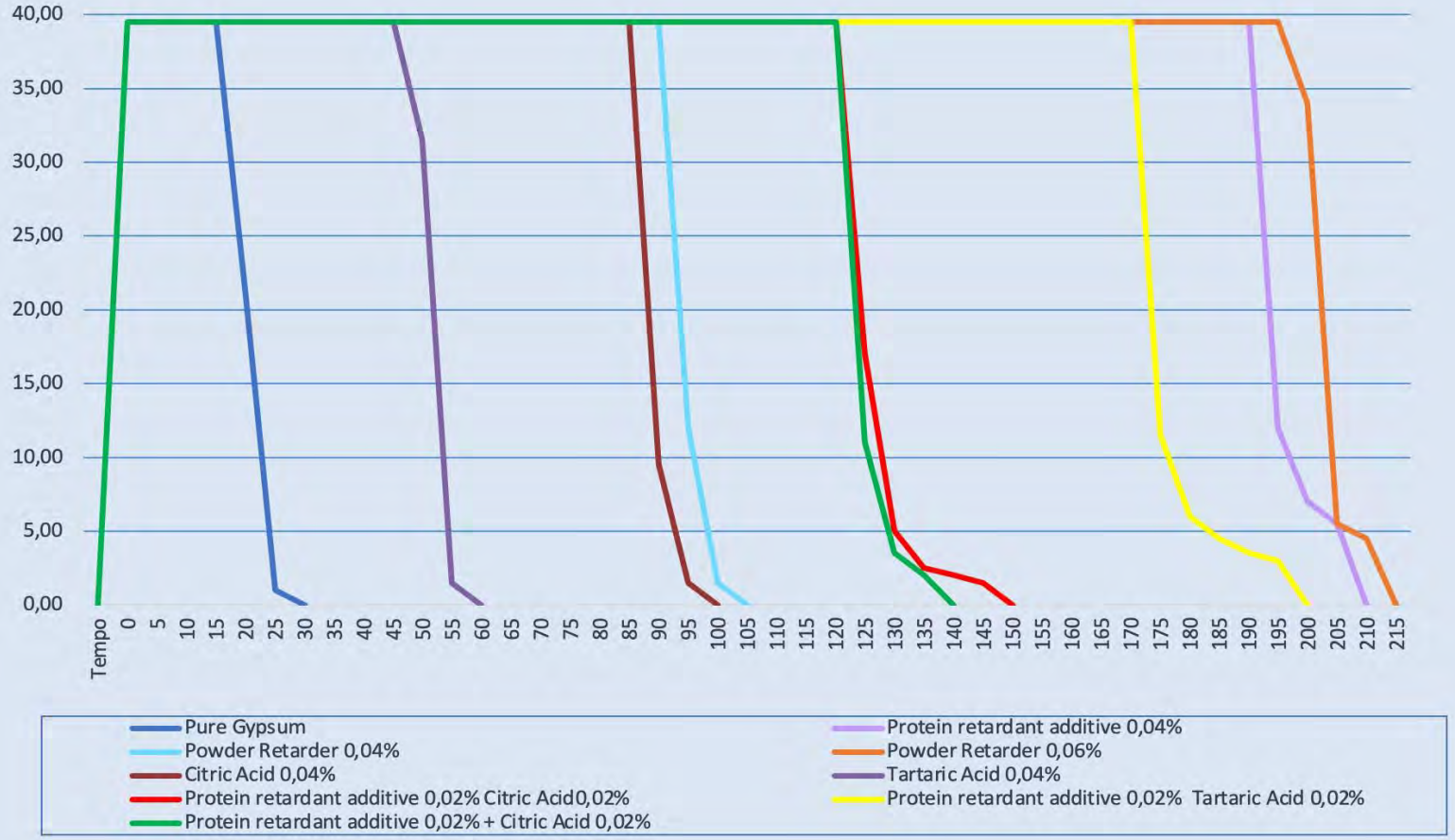
COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM SYSTEM



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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	HEMIHYDRATE GYPSUM
TYPE OF TEST	Standard water intake
REFERENCE STANDARD/METHOD	Determination of the consistency of fresh mortar by means of a shaking table EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN 196-1
TIME INSTRUMENTATION	DIGITAL SECOND COUNTER
BALANCE	SCALE WITH ACCURACY OF 0.01gr

WATER INTAKE		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	MIXING WATER	
POWER RETARD	65%	
PLAST RETARD	65%	
CITRIC ACID	65%	
TARTARIC ACID	65%	

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	HEMIHYDRATE GYPSUM
TYPE OF TEST	Setting time
REFERENCE STANDARD/METHOD	Determination of setting time using Vicat needle EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	VICAT NEEDLE

SETTING TIME		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	START OF GRIP	END OF TAKE
PURE GYPSUM	20 min	30 min
POWER RETARD 0.04%	95 min	105 min
POWER RETARD 0.06%	200 min	215 min
PROTEIN RETARDANT ADDITIVE 0.04%	195 min	210 min
CITRIC ACID 0.04%	90 min	100 min
TARTARIC ACID 0.04%	50 min	60 min
PROTEIN RETARDANT ADDITIVE 0.02% + CITRIC ACID 0.02%	125 min	150 min
PROTEIN RETARDANT ADDITIVE 0.02% + TARTARIC ACID 0.02%	175 min	200 min
POWER RETARD 0.02% + CITRIC ACID 0.02%	125 min	140 min
POWER RETARD 0.02% + TARTARIC ACID 0.02%	75 min	90 min

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COMPARATIVE STUDY OF RETARDANTS IN THE PLASTER SYSTEM

SUBJECT OF THE STUDY: RETARDANTS IN A HEMIHYDRATE GYPSUM-BASED PLASTER SYSTEM

The aim of the study is to analyze the performance of different types of retarders in the formulation of hemihydrate gypsum plaster.

The study was performed on a gypsum and lime-based formulation with lightweight aggregates and aerating additives.

The important values to take into consideration are the setting time, the workability time and the mechanical resistances.

The analysis of the values of the formulation with the presence of the retarder Power Retard illustrates an optimal performance in the impact on the setting times and the workability time of the product.

Some retardants used, such as citric acid, are ineffective at the same dosage.
A very important fact to underline is the mechanical resistance obtained both at 7 days and at 28 days in which the plaster formulation with the presence of the power retard expresses the best performance.

The use of Power Retard expresses optimal values relating to the delay and maintenance of the premix, furthermore, by regulating the setting with the addition of Power Retard, an increase in mechanical resistance is obtained.

The study shows that Power Retard is compatible with aerating additives.

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PLASTER FORMULATION

	%			
HEMIHYDRATE PLASTER	36	36	36	36
HYDRATED LIME	5	5	5	5
CELLULOSE 20000	0.12	0.12	0.12	0.12
CARBONATE 01-06	27	27	27	27
CARBONATE 06-1,2	21	21	21	21
CALCIUM CARBONATE FILLER	8.31	8.31	8.31	8.31
PERLITE 13	2.5	2.5	2.5	2.5
AIR ADDITIVE	0.018	0.018	0.018	0.018
STARCH	0.012	0.012	0.012	0.012
POWDER RETARDER	0.04			
PROTEIN RETARDANT ADDITIVE		0.04		
CITRIC ACID			0.04	
TARTARIC ACID				0.04

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM-BASED PLASTER SYSTEM

CUSTOMER	**ICE PHARMA**
MATERIAL AND/OR SAMPLE UNDER TEST	PLASTER
TYPE OF TEST	Water intake by spreading with a shaking table
REFERENCE STANDARD/METHOD	Determination of the consistency of fresh mortar by means of a shaking table EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	SHOCK TABLE AND TRUNCATED CONICAL MOULD
MEASURING INSTRUMENTS	MEASURING CALIPER FOR 300 mm DIAMETER WITH ACCURACY OF 0,01 mm
TIME INSTRUMENTATION	DIGITAL SECOND COUNTER

WATER INTAKE		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	MIXING WATER	SPREADING
POWDER RETARDER	35%	161mm
PROTEIN RETARDANT ADDITIVE	35%	153mm
CITRIC ACID	35%	182mm
TARTARIC ACID	35%	155mm

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM-BASED PLASTER SYSTEM

CUSTOMER	**ICE PHARMA**
MATERIAL AND/OR SAMPLE UNDER TEST	PLASTER
TYPE OF TEST	Setting time
REFERENCE STANDARD/METHOD	Determination of setting time using Vicat needle EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN 196-1
INSTRUMENTATION OFTRIAL	VICAT NEEDLE

SETTING TIME		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	START OF GRIP	END OF TAKE
POWDER RETARDER	85 min	100 min
PROTEIN RETARDANT ADDITIVE	110 min	125 min
CITRIC ACID	55 min	70 min
TARTARIC ACID	215 min	325 min

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM-BASED PLASTER SYSTEM

CUSTOMER	**ICE PHARMA**
MATERIAL AND/OR SAMPLE UNDER TEST	PLASTER
TYPE OF TEST	Mechanical resistance 7 days
REFERENCE STANDARD/METHOD	Determination of flexural and compressive strength EN 13279-2
EQUIPMENT	
BENDING AND COMPRESSION MACHINE	CONTROLS L13V2/LC (s/n 08001721)
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	Moulds compliant with EN196-1
COMPACTION TOOLS	Vibrating table

MECHANICAL RESISTANCE 7 DAYS		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	FLEXION	COMPRESSION
POWDER RETARDER	1.73 Mpa	3.64 Mpa
PROTEIN RETARDANT ADDITIVE	0.68 Mpa	1.74 Mpa
CITRIC ACID	1.00 Mpa	1.71 Mpa
TARTARIC ACID	1.01 Mpa	1.75 Mpa

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM-BASED PLASTER SYSTEM

CUSTOMER	**ICE PHARMA**
MATERIAL AND/OR SAMPLE UNDER TEST	PLASTER
TYPE OF TEST	Mechanical resistance 28 days
REFERENCE STANDARD/METHOD	Determination of flexural and compressive strength EN 13279-2
EQUIPMENT	
BENDING AND COMPRESSION MACHINE	CONTROLS L13V2/LC (s/n 08001721)
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	Moulds compliant with EN196-1
COMPACTION TOOLS	Vibrating table

MECHANICAL RESISTANCE 28 DAYS		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	FLEXION	COMPRESSION
POWDER RETARDER	1.77 Mpa	3.71 Mpa
PROTEIN RETARDANT ADDITIVE	1.02 Mpa	1.74 Mpa
CITRIC ACID	1.19 Mpa	2.56 Mpa
TARTARIC ACID	1.07 Mpa	1.78 Mpa

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM-BASED PLASTER SYSTEM

CUSTOMER	**ICE PHARMA**
MATERIAL AND/OR SAMPLE UNDER TEST	PLASTER
TYPE OF TEST	Pot life
REFERENCE STANDARD/METHOD	Internal standard
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	Digital stopwatch
COMPACTION TOOLS	Spatula
MEASURING INSTRUMENTS	Digital scale with 0.01g precision

POT LIFE		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
POWDER RETARDER	40mm	
PROTEIN RETARDANT ADDITIVE	70mm	
CITRIC ACID	25mm	
TARTARIC ACID	110mm	

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM-BASED PLASTER SYSTEM

CUSTOMER	**ICE PHARMA**
MATERIAL AND/OR SAMPLE UNDER TEST	PLASTER
TYPE OF TEST	Occluded air
REFERENCE STANDARD/METHOD	Norm
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	Porosimeter
TIME INSTRUMENTATION	Digital stopwatch
MEASUREMENT INSTRUMENTATION	Digital scale with 0.01g precision

OCCLUDED AIR		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
POWDER RETARDER	26%	
PROTEIN RETARDANT ADDITIVE	27%	
CITRIC ACID	23%	
TARTARIC ACID	29%	

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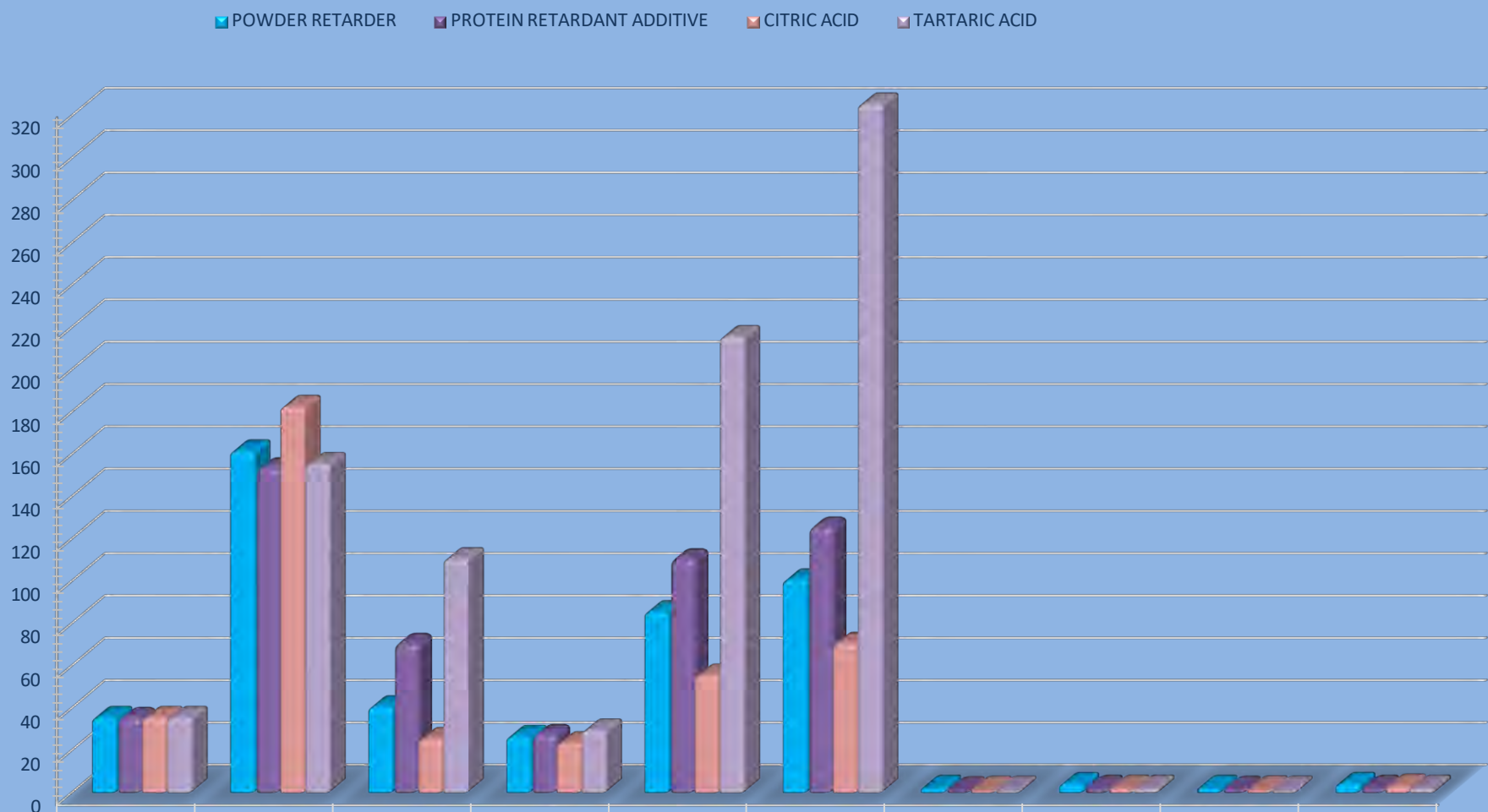
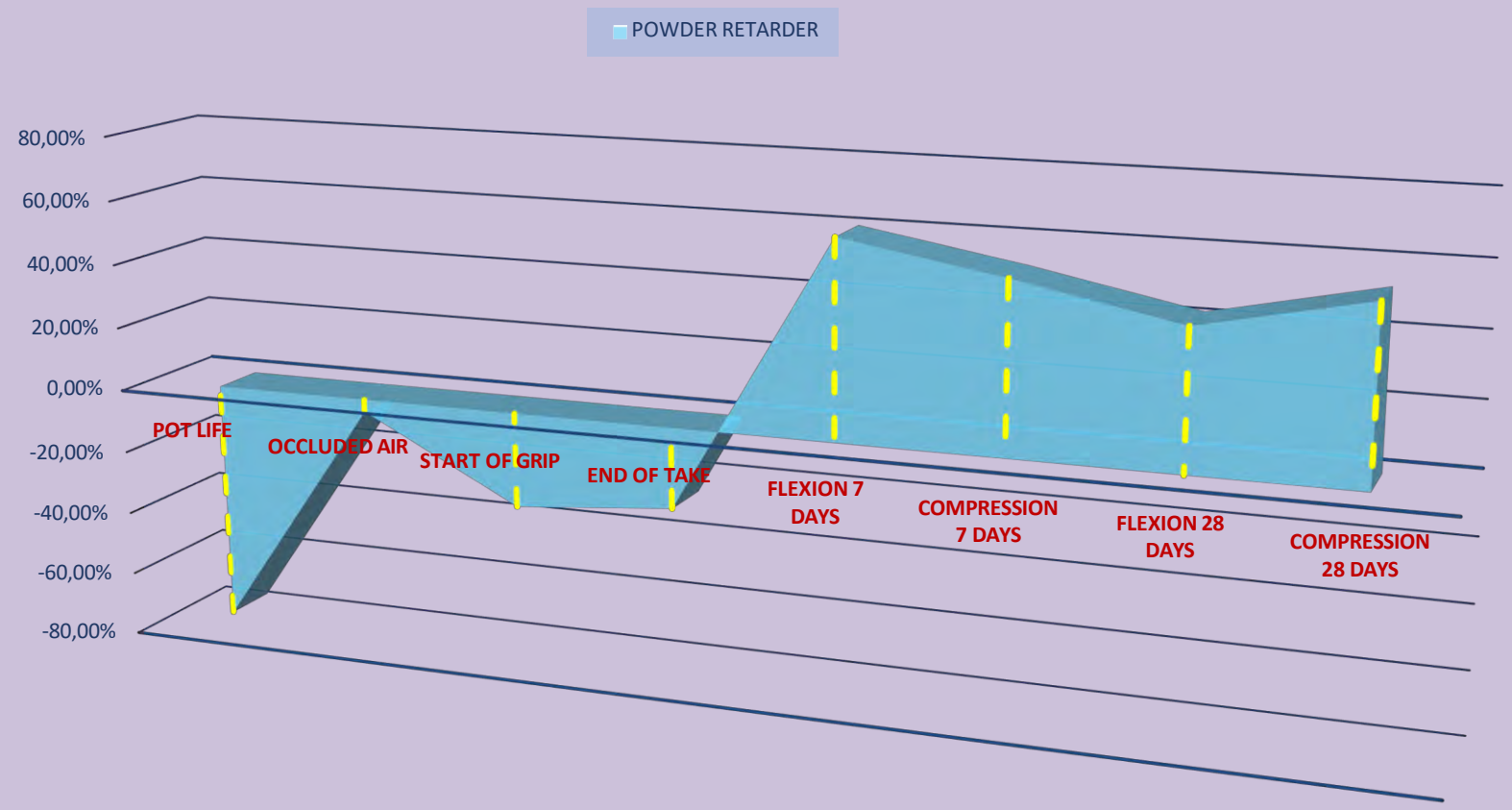
PERFORMANCE VALUES



	MIXING WATER	SPREADING	POT LIFE	OCCLUDED AIR	START OF GRIP	END OF TAKE	FLEXION 7 DAYS	COMPRESSION 7 DAYS	FLEXION 28 DAYS	COMPRESSION 28 DAYS
POWDER RETARDER	35,00	161,00	40,00	26,00	85,00	100,00	1,73	3,64	1,77	3,71
PROTEIN RETARDANT ADDITIVE	35,00	153,00	70,00	27,00	110,00	125,00	0,68	1,74	1,02	1,74
CITRIC ACID	35,00	182,00	25,00	23,00	55,00	70,00	1,00	1,71	1,19	2,56
TARTARIC ACID	35,00	155,00	110,00	29,00	215,00	325,00	1,01	1,75	1,07	1,78

PERFORMANCE AS A %



	POT LIFE	OCCLUDED AIR	START OF GRIP	END OF TAKE	FLEXION 7 DAYS	COMPRESSION 7 DAYS	FLEXION 28 DAYS	COMPRESSION 28 DAYS
POWDER RETARDER	-75,00%	-3,85%	-29,41%	-25,00%	60,69%	52,20%	42,37%	53,10%

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM BASED SKIMMING MORTAR SYSTEM

SUBJECT OF THE STUDY: RETARDANTS IN THE HEMIHYDRATE GYPSUM BASED SKIMMING MORTAR SYSTEM

The aim of the study is to analyse the performance of different types of retarders in the formulation of a hemihydrate gypsum-based smoothing compound, without hydrated lime, with cellulose ethers and polymers.

The inclusion of the retarder in this type of product increases the workability times.

In this formulation, with the absence of lime and the insertion of protein-based retarders, a significant increase in times is obtained which is not demonstrated with the insertion of salt-based retarders.

The inhibition characteristic of calcium sulphate DI-hydrate crystals demonstrates the high efficiency of Power Retard even at low dosages.

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FORMULATION OF SKIMMING MORTAR GYPSUM BASED

	%	%	%	%
PLASTER	60	60	60	60
CELLULOSE 30000	0.10	0.10	0.10	0.10
RESIN TG15	1.50	1.50	1.50	1.50
SEPPIOLITE	0.5	0.5	0.5	0.5
CALCIUM CARBONATE FILLER	37.76	37.76	37.76	37.76
STARCH	0.10	0.10	0.10	0.10
POWDER RETARDER	0.04			
PROTEIN RETARDANT ADDITIVE		0.04		
CITRIC ACID			0.04	
TARTARIC ACID				0.04

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM BASED
TYPE OF TEST	Water intake by spreading with a shaking table
REFERENCE STANDARD/METHOD	Determination of the consistency of fresh mortar by means of a shaking table EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN 196-1
INSTRUMENTATION OFTRIAL	SHOCK TABLE AND TRUNCATED CONICAL MOULD
MEASURING INSTRUMENTS	MEASURING CALIPER FOR 300 mm DIAMETER WITH ACCURACY OF 0,01 mm
TIME INSTRUMENTATION	DIGITAL SECOND COUNTER

WATER INTAKE		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	MIXING WATER	SPREADING
POWDER RETARDER	46%	171mm
PROTEIN RETARDANT ADDITIVE	46%	156mm
CITRIC ACID	46%	152mm
TARTARIC ACID	46%	164mm

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM BASED
TYPE OF TEST	Setting time
REFERENCE STANDARD/METHOD	Determination of setting time using Vicat needle EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN 196-1
INSTRUMENTATION OFTRIAL	VICAT NEEDLE

SETTING TIME		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	START OF GRIP	END OF TAKE
POWDER RETARDER	300 min	330 min
PROTEIN RETARDANT ADDITIVE	265 min	290 min
CITRIC ACID	110 min	115 min
TARTARIC ACID	30 min	35 min

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM BASED
TYPE OF TEST	Mechanical resistance 7 days
REFERENCE STANDARD/METHOD	Determination of flexural and compressive strength EN 13279-2
EQUIPMENT	
BENDING AND COMPRESSION MACHINE	CONTROLS L13V2/LC (s/n 08001721)
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN 196-1
INSTRUMENTATION OFTRIAL	Moulds compliant with EN 196-1
COMPACTION TOOLS	Vibrating table

MECHANICAL RESISTANCE 7 DAYS		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	FLEXION	COMPRESSION
POWDER RETARDER	2.29 Mpa	5.28 Mpa
PROTEIN RETARDANT ADDITIVE	2.07 Mpa	4.86 Mpa
CITRIC ACID	1.22 Mpa	3.47 Mpa
TARTARIC ACID	1.70 Mpa	5.77 Mpa

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM BASED
TYPE OF TEST	Mechanical resistance 28 days
REFERENCE STANDARD/METHOD	Determination of flexural and compressive strength EN 13279-2
EQUIPMENT	
BENDING AND COMPRESSION MACHINE	CONTROLS L13V2/LC (s/n 08001721)
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN 196-1
INSTRUMENTATION OFTRIAL	Moulds compliant with EN 196-1
COMPACTION TOOLS	Vibrating table

MECHANICAL RESISTANCE 28 DAYS		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	FLEXION	COMPRESSION
POWDER RETARDER	2.10 Mpa	5.38 Mpa
PROTEIN RETARDANT ADDITIVE	2.37 Mpa	5.64 Mpa
CITRIC ACID	2.63 Mpa	6.80 Mpa
TARTARIC ACID	3.89 Mpa	10.14 Mpa

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COMPARATIVE STUDY OF RETARDANTS IN THE HEMIHYDRATE GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM BASED
TYPE OF TEST	Pot life
REFERENCE STANDARD/METHOD	Internal standard
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN 196-1
INSTRUMENTATION OFTRIAL	Digital stopwatch
COMPACTION TOOLS	Spatula

POT LIFE		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C±2%	
HUMIDITY'	65 ± 5 %	
POWDER RETARDER	140mm	
PROTEIN RETARDANT ADDITIVE	165mm	
CITRIC ACID	50mm	
TARTARIC ACID	15mm	

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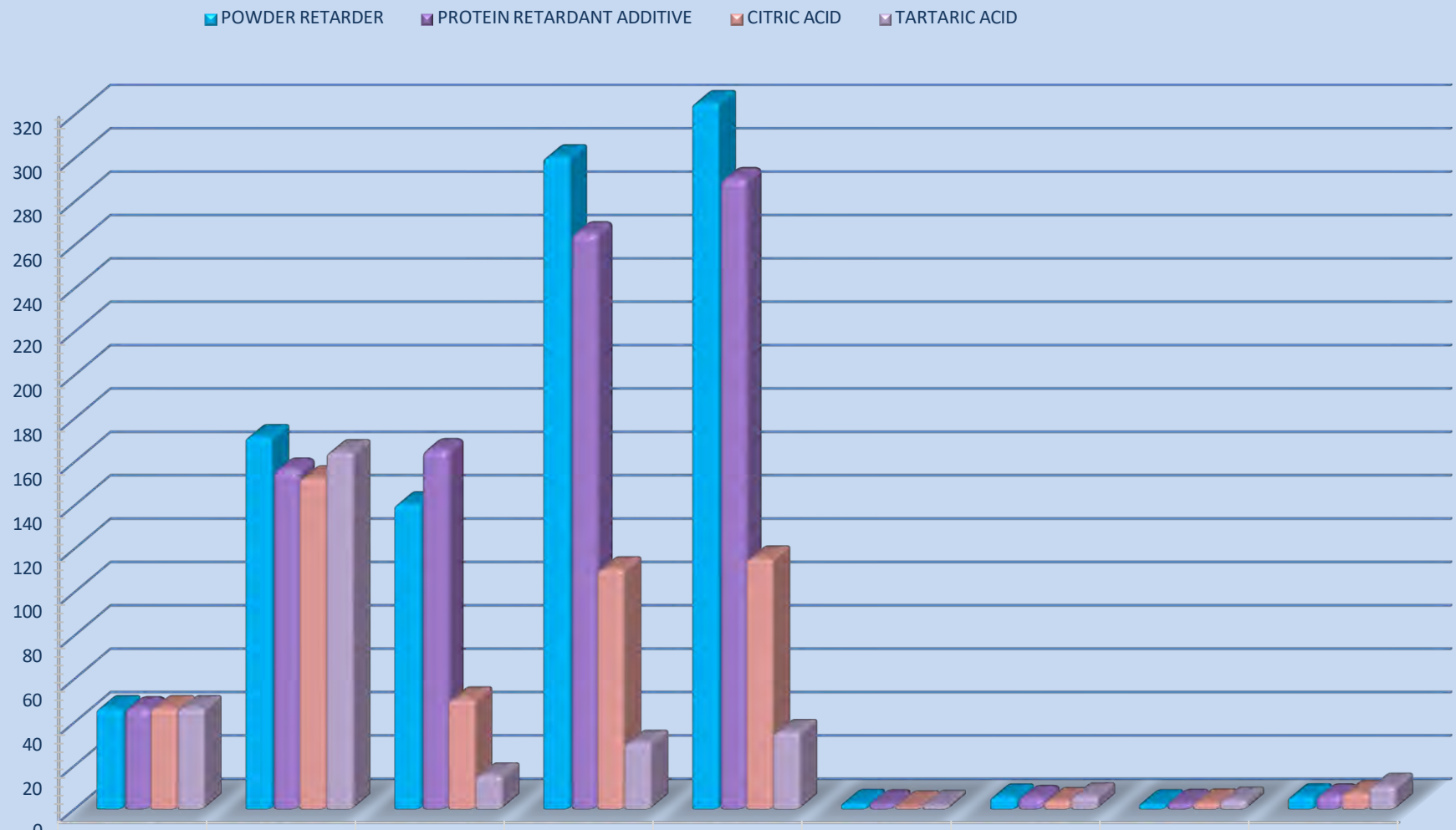
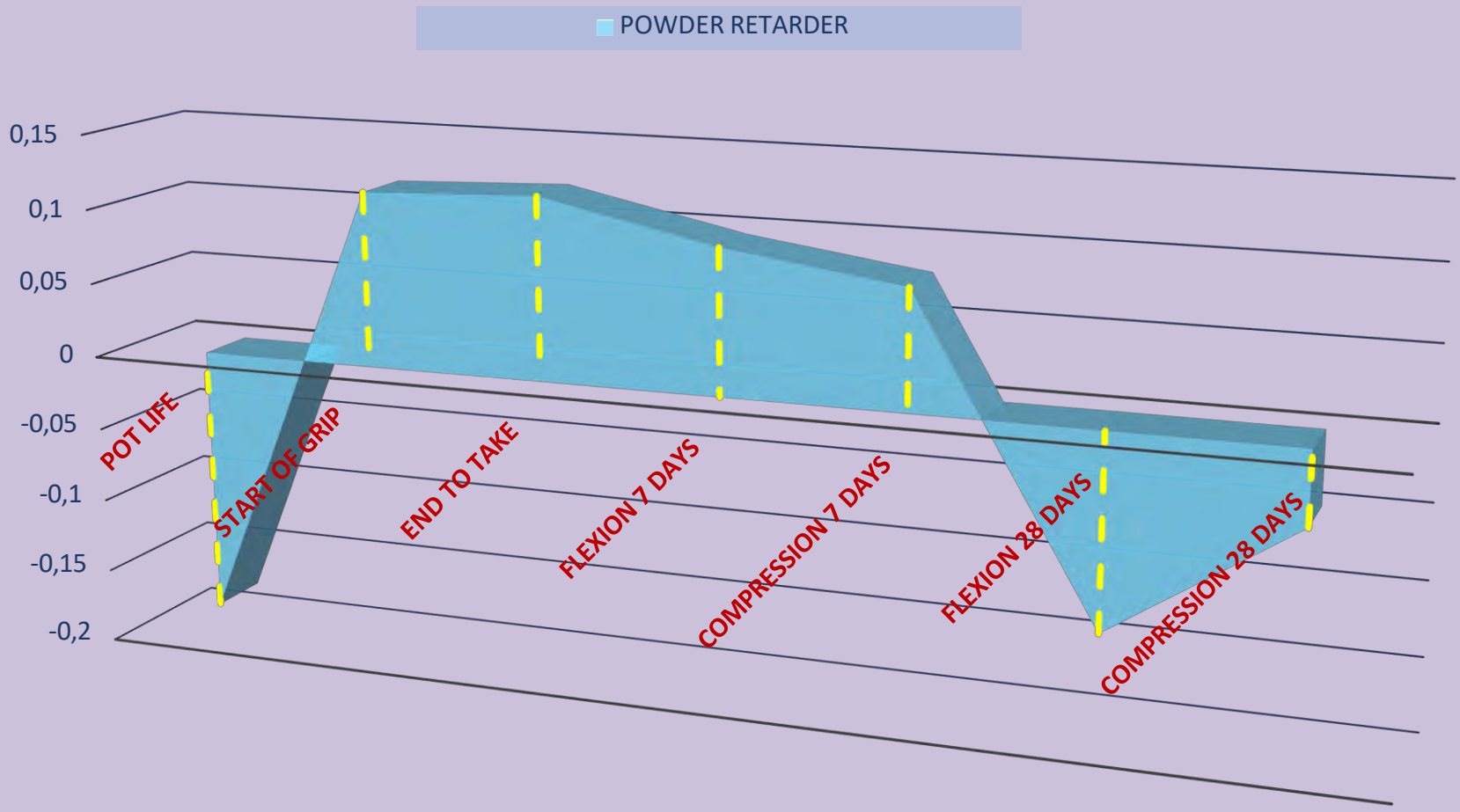
PERFORMANCE VALUES



	MIXING WATER	SPREADING	POT LIFE	START OF GRIP	END TO TAKE	FLEXION 7 DAYS	COMPRESSION 7 DAYS	FLEXION 28 DAYS	COMPRESSION 28 DAYS
POWDER RETARDER	46,00	171,00	140,00	300,00	330,00	2,29	5,28	2,10	5,38
PROTEIN RETARDANT ADDITIVE	46,00	156,00	165,00	265,00	290,00	2,07	4,86	2,37	5,64
CITRIC ACID	46,00	152,00	50,00	110,00	115,00	1,22	3,47	2,63	6,80
TARTARIC ACID	46,00	164,00	15,00	30,00	35,00	1,70	5,77	3,89	10,14

PERFORMANCE AS A %



	POT LIFE	START OF GRIP	END TO TAKE	FLEXION 7 DAYS	COMPRESSION 7 DAYS	FLEXION 28 DAYS	COMPRESSION 28 DAYS
POWDER RETARDER	-17,86%	11,67%	12,12%	9,61%	7,95%	-12,86%	-4,83%

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COMPARATIVE STUDY OF RETARDANTS IN THE LIME AND GYPSUM BASED SYSTEM

SUBJECT OF THE STUDY: RETARDANTS IN THE LIME AND GYPSUM BASED SKIMMING MORTAR SYSTEM

The aim of the study is to analyze the performance of different types of retarders in the formulation of a plaster based on gypsum, lime, cellulose ethers and powdered polymer.

The main characteristics of the formulated product required by the market are the workability of the product for times longer than 90 minutes in order to guarantee the construction operator the possibility of operating on large surfaces.

From the comparative study it is clear that Power Retard, even at low dosages, has an excellent performance and develops a notable increase in the mechanical resistance of the final product.

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FORMULATION OF SKIMMING MORTAR GYPSUM AND LIME BASED

	%	%	%	%
HEMIHYDRATE PLASTER	60	60	60	60
HYDRATED LIME	3	3	3	3
CELLULOSE 30000	0.10	0.10	0.10	0.10
RESIN TG15	1.50	1.50	1.50	1.50
SEPPIOLITE	0.05	0.05	0.05	0.05
CALCIUM CARBONATE FILLER	35,31	35,31	35,31	35,31
POWDER RETARDER	0.04			
PROTEIN RETARDANT ADDITIVE		0.04		
CITRIC ACID			0.04	
TARTARIC ACID				0.04

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COMPARATIVE STUDY OF RETARDANTS IN THE LIME AND GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM AND LIME BASED
TYPE OF TEST	Water intake by spreading with a shaking table
REFERENCE STANDARD/METHOD	Determination of the consistency of fresh mortar by means of a shaking table EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	SHOCK TABLE AND TRUNCATED CONICAL MOULD
MEASURING INSTRUMENTS	MEASURING CALIPER FOR 300 mm DIAMETER WITH ACCURACY OF 0,01 mm
TIME INSTRUMENTATION	DIGITAL SECOND COUNTER

WATER INTAKE		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	MIXING WATER	SPREADING
POWDER RETARDER	46%	169mm
PROTEIN RETARDANT ADDITIVE	46%	168mm
CITRIC ACID	46%	170mm
TARTARIC ACID	46%	171mm

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COMPARATIVE STUDY OF RETARDANTS IN THE LIME AND GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM AND LIME BASED
TYPE OF TEST	Setting time
REFERENCE STANDARD/METHOD	Determination of setting time using Vicat needle EN 13279-2
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	VICAT NEEDLE

SETTING TIME		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	START OF GRIP	END OF TAKE
POWDER RETARDER	100 min	110 min
PROTEIN RETARDANT ADDITIVE	100 min	110 min
CITRIC ACID	35 min	40 min
TARTARIC ACID	215 min	280 min

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COMPARATIVE STUDY OF RETARDANTS IN THE LIME AND GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM AND LIME BASED
TYPE OF TEST	Mechanical resistance 7 days
REFERENCE STANDARD/METHOD	Determination of flexural and compressive strength EN 13279-2
EQUIPMENT	
BENDING AND COMPRESSION MACHINE	CONTROLS L13V2/LC (s/n 08001721)
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	Moulds compliant with EN196-1
COMPACTION TOOLS	Vibrating table

MECHANICAL RESISTANCE 7 DAYS		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	FLEXION	COMPRESSION
POWDER RETARDER	3.95 Mpa	8.83 Mpa
PROTEIN RETARDANT ADDITIVE	2.00 Mpa	6.34 Mpa
CITRIC ACID	3.76 Mpa	8.84 Mpa
TARTARIC ACID	2.59 Mpa	7.13 Mpa

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COMPARATIVE STUDY OF RETARDANTS IN THE LIME AND GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	ICE PHARMA
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM AND LIME BASED
TYPE OF TEST	Mechanical resistance 28 days
REFERENCE STANDARD/METHOD	Determination of flexural strength and compressive strength EN 13279-2
EQUIPMENT	
BENDING AND COMPRESSION MACHINE	CONTROLS L13V2/LC (s/n 08001721)
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	Moulds compliant with EN196-1
COMPACTION TOOLS	Vibrating table

MECHANICAL RESISTANCE 28 DAYS		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
SAMPLE	FLEXION	COMPRESSION
POWDER RETARDER	3.59 Mpa	9.39 Mpa
PROTEIN RETARDANT ADDITIVE	3.49 Mpa	8.83 Mpa
CITRIC ACID	4.15 Mpa	9.62 Mpa
TARTARIC ACID	2.69 Mpa	7.14 Mpa

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COMPARATIVE STUDY OF RETARDANTS IN THE LIME AND GYPSUM BASED SKIMMING MORTAR SYSTEM

CUSTOMER	**ICE PHARMA**
MATERIAL AND/OR SAMPLE UNDER TEST	SKIMMING MORTAR GYPSUM AND LIME BASED
TYPE OF TEST	Pot life
REFERENCE STANDARD/METHOD	Internal standard
EQUIPMENT	
MIXER	TYPE HOBART BRAND CONTROLS compliant with EN196-1
INSTRUMENTATION OFTRIAL	Digital stopwatch
COMPACTION TOOLS	Spatula

POT LIFE		
PRODUCT LAYOUT	IN TEMPERATURE CONDITIONS 20°C ± 2%	
HUMIDITY'	65 ± 5 %	
POWDER RETARDER	60mm	
PROTEIN RETARDANT ADDITIVE	70 mm	
CITRIC ACID	15mm	
TARTARIC ACID	110mm	

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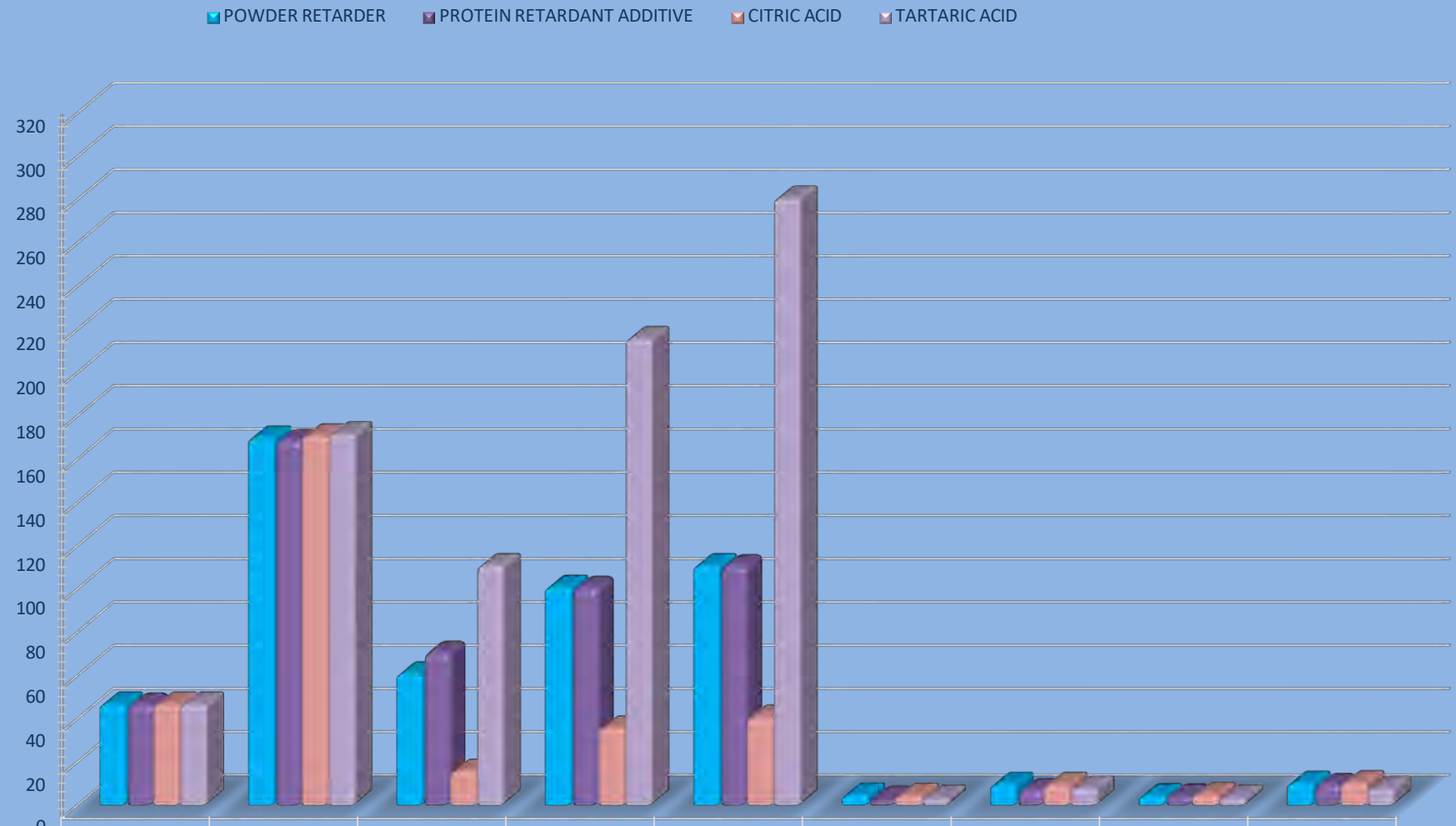
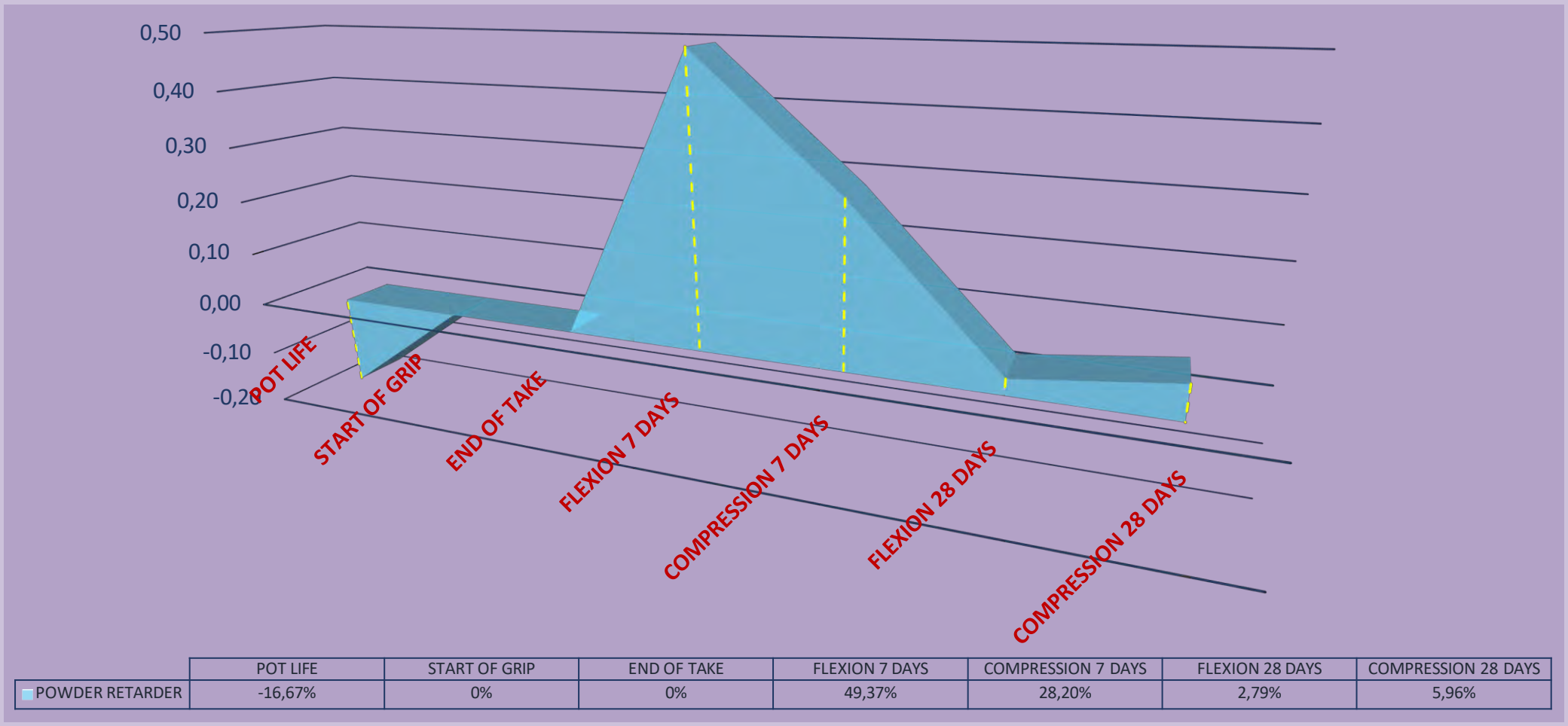
PERFORMANCE VALUES



	MIXING WATER	SPREADING	POT LIFE	START OF GRIP	END OF TAKE	FLEXION 7 DAYS	COMPRESSION 7 DAYS	FLEXION 28 DAYS	COMPRESSION 28 DAYS
POWDER RETARDER	46,00	169,00	60,00	100,00	110,00	3,95	8,83	3,59	9,39
PROTEIN RETARDANT ADDITIVE	46,00	168,00	70,00	100,00	110,00	2,00	6,34	3,49	8,83
CITRIC ACID	46,00	170,00	15,00	35,00	40,00	3,76	8,84	4,15	9,62
TARTARIC ACID	46,00	171,00	110,00	215,00	280,00	2,59	7,13	2,69	7,14

PERFORMANCE AS A %



	POT LIFE	START OF GRIP	END OF TAKE	FLEXION 7 DAYS	COMPRESSION 7 DAYS	FLEXION 28 DAYS	COMPRESSION 28 DAYS
POWDER RETARDER	-16,67%	0%	0%	49,37%	28,20%	2,79%	5,96%

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