SICIT GROUP S.p.A.

PlastRetard®PE

POWDER FORM

The multifunctional additive for higher quality products.

GYPSUM SETTING RETARDER

> Extension of the initial setting.
> High performance at low dosage.
> Standardized quality.
> Biodegradable product.
> Long Shelf Life (over 3 years).
> Compatible with other additives.
> Not affecting strength.
> Not nourishing moulds.

PlastRetard® PE

The Multifunctional additive

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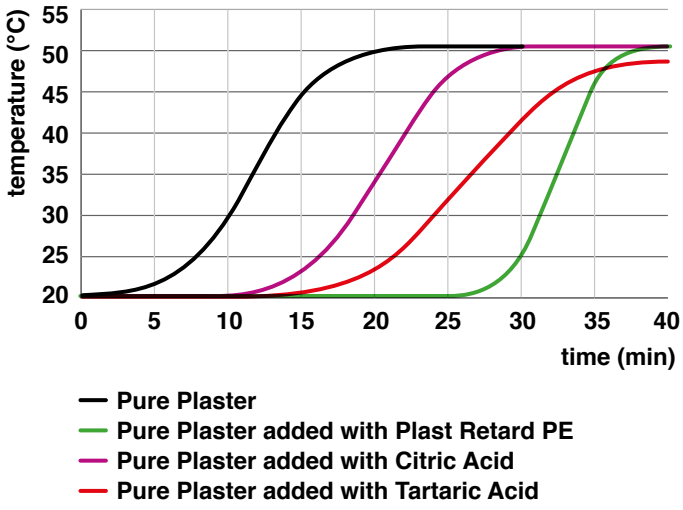
THE USE OF SETTING RETARDERS IN THE BUILDING INDUSTRY

The gypsum industry has constantly increased over the last 100 years with a very strong peak during the last decades.

For these reasons and according to the application needs of the final users, Plaster producers were obliged to introduce additives able to modify the behaviour and the characteristics of the different building materials.

In the below figure, we can notice the ability of different retarders to specifically modify the setting kinetic of a certain plaster.



Additives commonly used in Plaster production industry

Plasters are applied in the building sites by craftsmen according to local traditions, which can vary considerably from one region to another.

The workability of gypsums depends on a complex interplay of different parameters such as the origin of the gypsum (natural or artificial), the kind and the amount of impurities, the production (calcination process and grinding conditions) and the amount of water with which the gypsum is mixed as well the preparation and the application.

Today, plasters are formulated products which **contain at least one retarder**, in order to provide a larger window of workability. The properties of the building materials, such as strength and porosity, depend on manufacturing techniques, the application of appropriate additives and the water/gypsum ratio. In particular, additives must be rigorously selected in order to give the best result relative to defined specifications.

Some common additives used in gypsum formulations are here below described:

- Water Retentioners
- Thickeners
- Dispersing agents
- Plasticizers
- Retarders

All the above additives are compatible with PLAST RETARD PE.

PLAST RETARD PE can be used advantageously in neutral gypsum formulations avoiding the traditional use of lime. Lime is well known for modifying gypsum setting properties.

Adding PLAST RETARD PE, on the other hand, does not modify the adherence power of gypsum formulations.

PLAST RETARD PE is an ivory-white powder, completely soluble in water, easy to disperse in a homogeneous way for its fine and suitable granulometry.

PARAMETERS TO BE OBSERVED WHEN SELECTING THE ADDITIVES

Since premixed powder products are applied by people on site, a set of requirements can be summarised keeping in mind that workability is characterised by the following properties:

Setting kinetics:
- Open time without stiffening adapted to the kind of work;
- Slow progress in stiffening.

Rheological properties:
- Easiness of distributing and planning;
- Stable Form (not flowing from the wall when worked on).

Finishing:
- Crack free;
- Ability to be smoothened.

Reliability:
- Stable water demand;
- Steady setting characteristics;
- Constant rheology.

Health aspects:
- No toxic substances allowed;
- Skin irritants to be avoided.

Additionally, some requirements on the finished product are to be considered:
- Requirements in adhesion on support;
- Requirements for hardness;
- Requirements for compression strength;
- Visual aspect.

The Retarder is one of the key additives in a plaster formulation, since it also controls the workability.

THE BASICS OF PLAST RETARD PE

How Plast Retard PE works

Plast Retard PE acts as a retarder in the gypsum-water mixture, slowing down the growth of the hydrate crystals. Its activity is characterized by the correlation between setting time and dosage, giving excellent performance even at low dosage rates.

Generally, Plast Retard PE is used alone in gypsum formulations but it is also compatible with citric acid and tartaric acid in order to obtain a delayed hardening and a suitable consistence/time diagram.

Combinations and Synergies

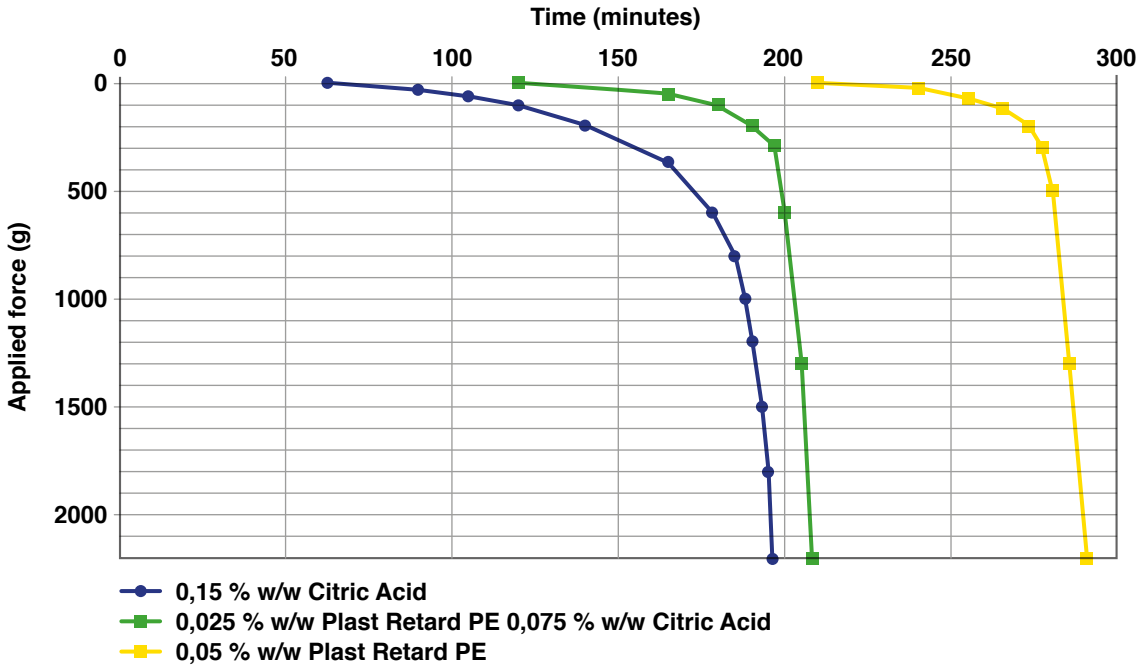
In many cases, a combination of different retarders allows to shape up the setting curve and get a profitable effect with lower costs.

The combination of two retarders leads to an increase of both activities due to a synergistic mechanism (see below graphs where PE has been used in a mix with Citric Acid and Tartaric Acid).

THE BASICS OF PLAST RETARD PE

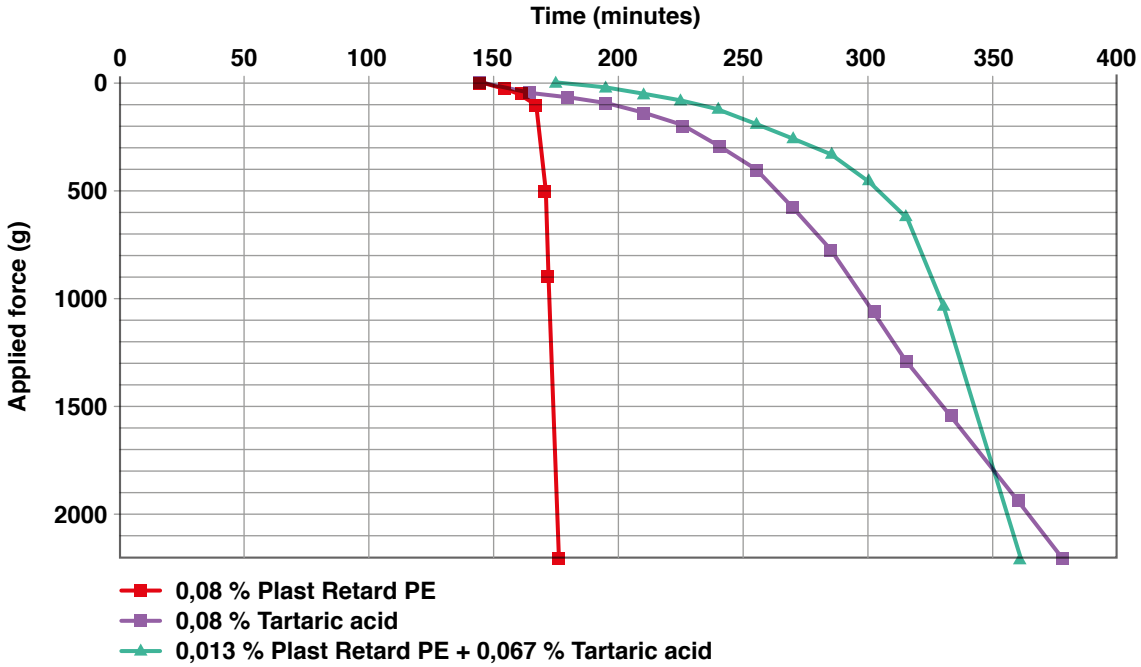
Plast Retard PE and Citric Acid

SETTING DIAGRAMS OBTAINED USING AN AUTOMATIC PENETROMETER RELATIVE TO CITRIC ACID/PLAST RETARD PE MIXTURES



Plast Retard PE and Tartaric Acid

SETTING DIAGRAMS OBTAINED USING AN AUTOMATIC PENETROMETER RELATIVE TO TARTARIC ACID/PLAST RETARD PE MIXTURE



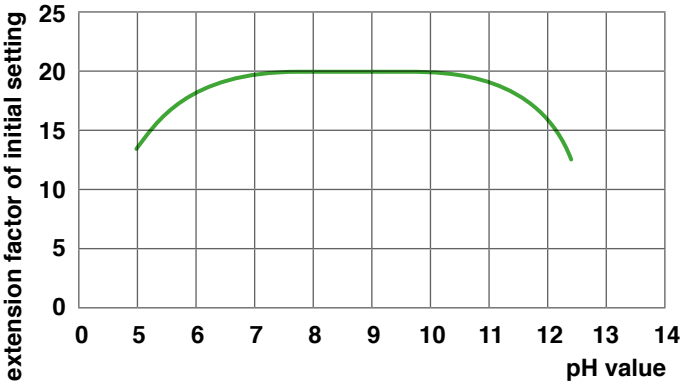
Plast Retard PE can also be used in gypsum formulations containing lime, traditionally added as thickener and anti-mould agent (best at pH 12).

Activity at different pH values

All retarders are sensitive to the pH value and some are active only at particular pH levels.

As shown in the following figure, Plast Retard PE is active in a pH range between 5 and 12.

Plast Retard PE shows its highest level of activity between pH 7 and 10 (see figure).



Benefits in industrial applications

The use of Plast Retard PE gives the possibility to control the setting in the range of minutes to several hours.

The use of Plast Retard PE in large and extensive production plants offers opportunities to reduce production costs, ensuring uniformity and product homogeneity.

The rate of setting and the hardening process can be adjusted advantageously to suit a long working cycle for materials applied on a big surface area. Using formulations containing Plast Retard PE, the operators will have the necessary time to apply, level and refine giving as a result a better bonding to the base.

Plast Retard PE ensures:
- a regular setting;
- a more homogeneous mixture;
- improving of the quality of the gypsum surface;
- increasing of the surface hardness;
- minor risks of cracking.

Different uses of Plast Retard PE

Plast Retard PE can be used in plaster formulations for the following sector:

- Moulding plaster;
- Ceramics;
- Plasterboard;
- Dental plaster/Medical Plaster;
- Joint fillers;
- Adhesion Mortars;
- Gypsum blocks;
- Stucco, plastering, machine application plasters.

THE BASICS OF PLAST RETARD PE

Plast Retard PE specifications

Chemical nature:	Degraded Polyamids, salified with calcium
Colour:	Ivory, white
Physical form:	solid, powder
Active substance:	>95 % w/w
Water content:	< 5 % w/w
Solubility in water:	Total
pH in a 10% w/w solutions:	7,0-8,5
Bulk density:	300÷400 g/L
Shelf Life:	3 years (if kept in the original packaging)

Plast Retard PE is carefully produced and controlled in our laboratories at every step of production, in order to assure a standardized final product.

Usage levels

The gypsum ability to be retarded is strongly influenced by intrinsic characteristics, such as the calcium sulfate hemihydrate, semihydrate and anhydrite content, the presence of inorganic impurities and other salts, lime and the pH value.

Usage levels must be adjusted for each singular formulation according to the required retarding effect, related to the gypsum manufacturing process and the final application.
A suitable consistency/time graph can be obtained by adding particular additives compatible with Plast Retard PE.
The activity of Plast Retard PE depends on the type of gypsum used (natural or synthetic), for this reason specific tests should be performed in order to quantify the correct dosage for a given setting time.

Compatibility

Plast Retard PE is compatible with inert substances, with the additives usually used in gypsum like plasticizers, surfactants and wetting agents in order to control properties like density, coverage and strength.

WHY CHOOSING PLAST RETARD PE

- Extension of the initial setting;
- High performance;
- Standardized quality;
- Biodegradable product;
- Long Shelf Life;
- Compatible with all other additives;
- Not affecting strength;
- Not nourishing moulds.

Stability at different Temperatures

Plast Retard PE can be used over a wide range of temperatures for its good thermal stability (until 300°C).

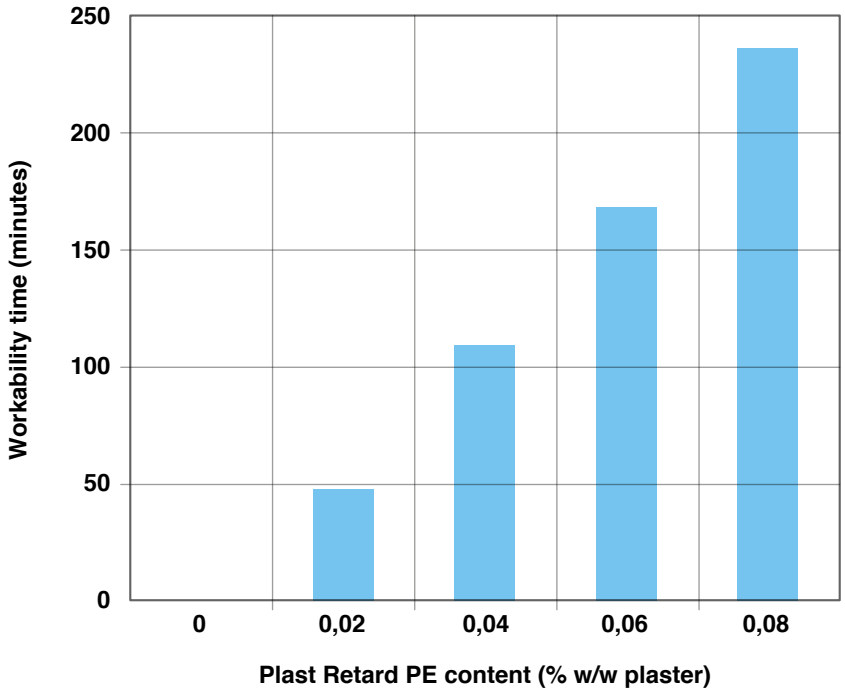
Here below Plast Retard PE stability has been tested over a wide range of temperatures.

Plast Retard PE dosage (% w/w gypsum)	Conditions	Setting Time (Minutes)		
		0g	Initial 600g	Final 2200g
0	-	22	42	52
0,015	20°C	112	136	146
0,015	150°C for 20 minutes	113	137	147
0,015	170°C for 20 minutes	118	148	157
0,015	200°C for 20 minutes	120	145	154

Proportional correlation between dosage rate and retarding effect

Plast Retard PE is a highly efficient setting retarder that increases the workability time proportionally to the dosage. The below figure shows an example of the linear relationship between dosage and setting time.

WORKABILITY TIME VERSUS PLAST RETARD PE DOSAGE

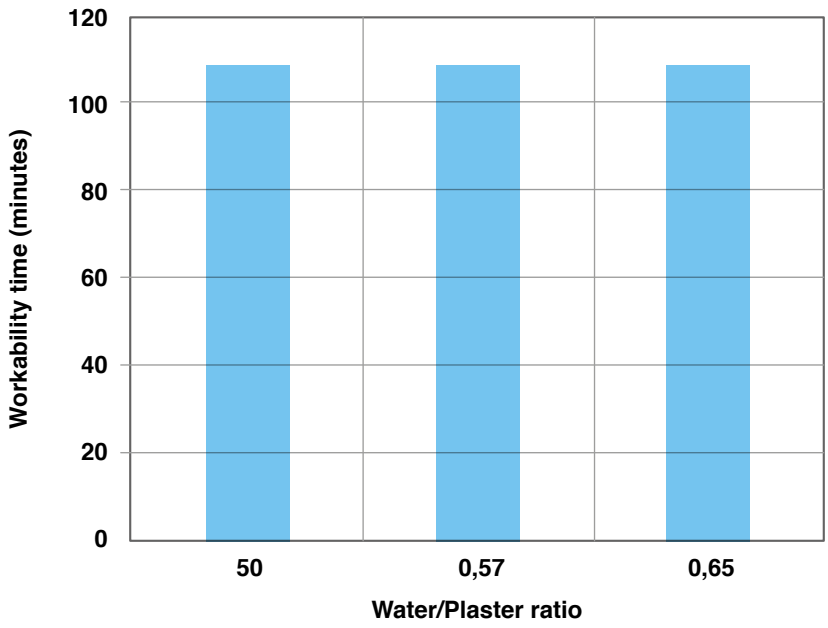


WHY CHOOSING PLAST RETARD PE

Stable activity at different water dosages

Plast Retard PE activity is not affected by the water/gypsum ratio, permitting to have a standardized quality gypsum in different working conditions.

WORKABILITY TIME VERSUS WATER/PLASTER RATIO RELATIVE TO PLASTER CONTAINING 0,04% W/W PLAST RETARD PE



Plast Retard PE does not affect resistance

The effect of retarders on the resistance of hardened stucco

	No Retarder	Plast Retard PE	Plast Retard PE
Retarder Content % of Plaster	0	0,08	0,40
Initial Setting Time VICAT Method (minutes)	24	40	165
Expansion (mm)	0,20	0,20	0,16
Flexural Strength (kg/cm2)	45	45	45
Compressive Strength (kg/cm2)	92	92	90

HANDLING AND STORAGE

Plast Retard PE is a hygroscopic product. Attention is required in order to avoid the exposed surface with air humidity.
The humidity adsorbed does not affect the properties as retarder, but the product is difficult to disperse when high amounts of water are adsorbed.

Humidity can be avoided preserving the product in closed containers, preparing the possible pre-mixture just when it is used and avoiding high relative humidity values in the working area.

Plast Retard PE does not contain preservatives and it is stable if stored in its original packaging or in suitable sealed containers.

TOXICOLOGY/ REGULATORY/ HEALTH, SAFETY AND ENVIRONMENT

By a toxicological point of view, Plast Retard PE is characterized by a LD50 superior to 5000 mg/Kg on male rat and it is not irritant according to 83/467/ CEE and so can be handled following the normal reasonable safety precautions according to good manufacturing procedures.

Ecology:
Plast Retard PE is produced using materials of natural origin and is totally biodegradable.
No special regulations apply to the transportation of Plast Retard PE.

AVAILABILITY AND SERVICE

This brochure serves as a reference to the technology and application of Plast Retard PE and is based on our current knowledge and experience. The technical department of SICIT GROUP S.p.A. is always available for further technical information and support.

Plast Retard PE is available in 20 Kg bags on 600 Kg pallet or 300 kg big bags.

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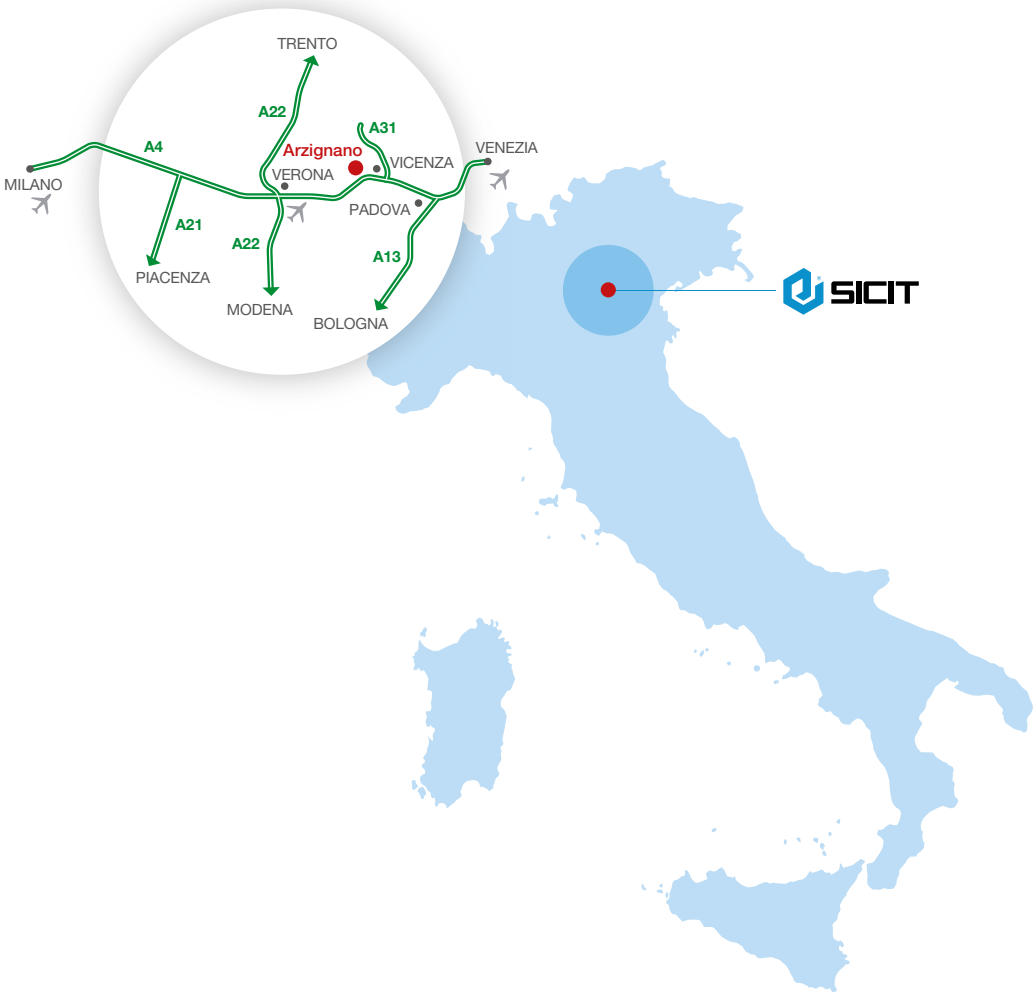

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