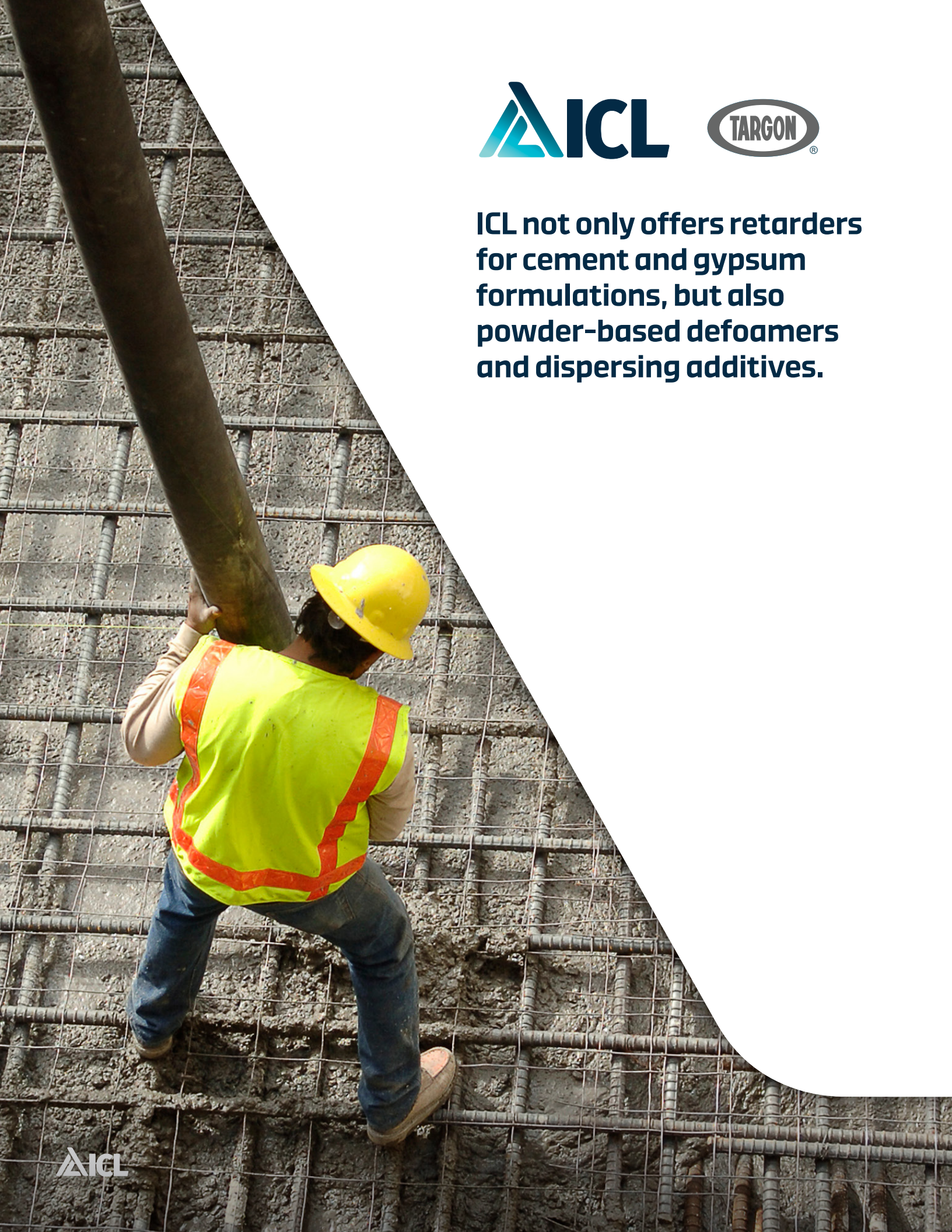
Construction Additives for Dry Mix Formulations

As a leading global chemical manufacturer, ICL's R&D team is continuously developing industrial solutions to manufacture safe, high-quality additives for the building and construction industry.



ICL TARGON®

ICL not only offers retarders for cement and gypsum formulations, but also powder-based defoamers and dispersing additives.

Cement-Based Systems

Retarders

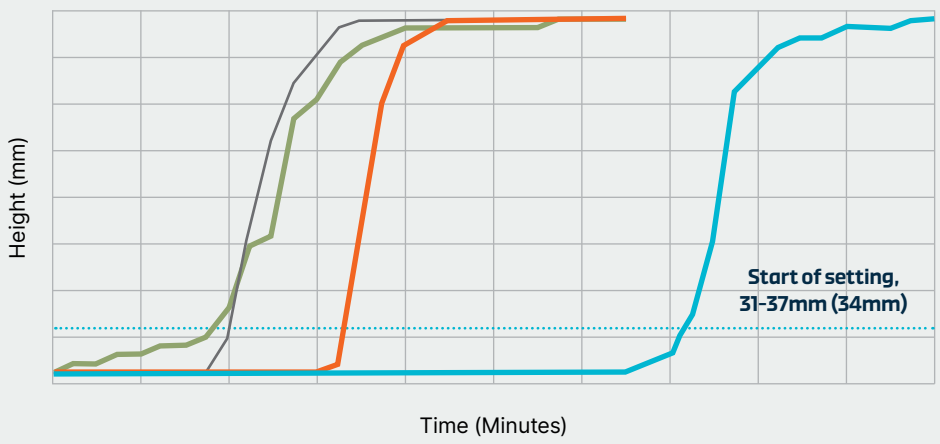
TARGON® 19 is our setting retarder for cement-based systems. It has proven itself to be extremely effective for various types of cement even under extreme conditions. With a dosage of only 0.1%, the setting time can be significantly prolonged to even three times longer.

Vicat Setting Test

Schwenk CEM I 32,5 R: TARGON® 19 setting performance versus other counterparts.

Key:

- Without Retarder
- Sodiumgluconate
- Ligninsulfonate
- TARGON® 19



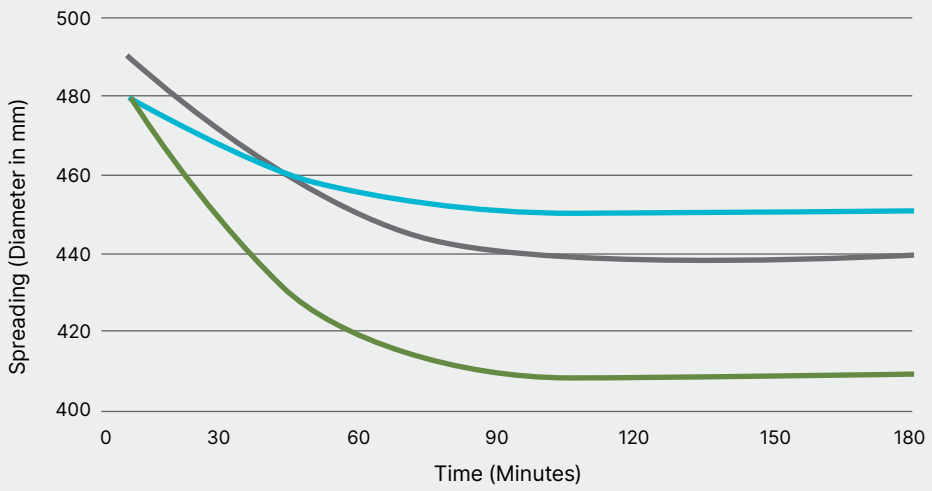
TARGON® 19 improves plasticity, is compatible with other additives, and offers high solubility and safe handling. It has a minimal influence in viscosity and unlike its gluconate and sulfonate-based counterparts, it does not impact the final hardness.

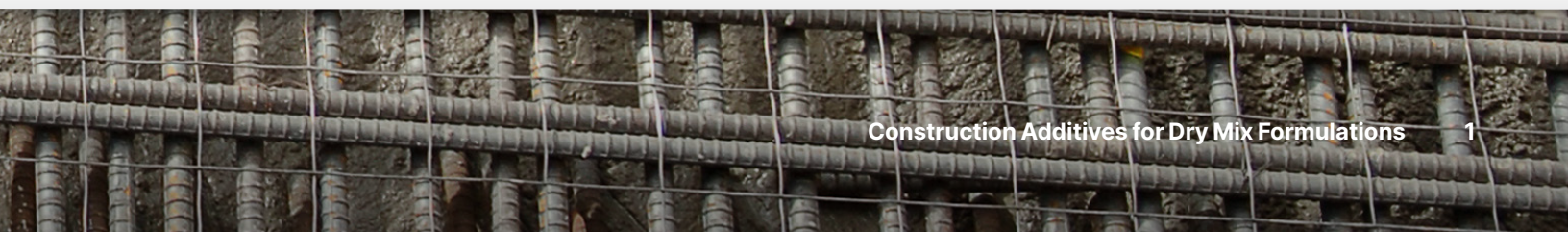
Spreading Test

Consistency of concrete

Key:

- Ligninsulfonate
- Sodiumgluconate
- TARGON® 19





In addition, TARGON® 19 improves the adhesion between lime cement plaster and concrete. This leads to improved adhesion properties of the two materials.

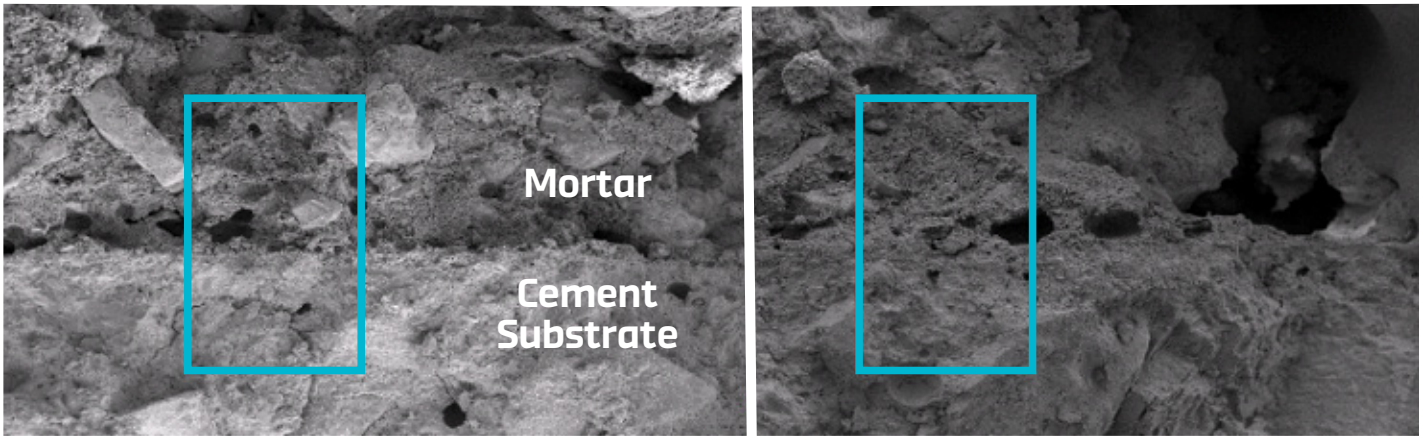
The table on the right shows an evaluation of the Tensile strength of mortar cement with and without the addition of TARGON® 19. The bond strength was significantly increased from 0.15 to 0.58 N/mm² in presence of TARGON® 19 after 28 days of curing. The bond strength increase was already visible after 14 days of curing.

System	Bond Strength After 14 Days	Bond Strength After 28 Days
Without Additives	0.38 N/mm²	0.15 N/mm²
With 0.1% TARGON® 19	0.65 N/mm²	0.58 N/mm²

A closer look at the interface of the mortar-cement bond via SEM microscopy shows that there is in fact a chemical interaction between the two substrates, which is proof of the better adhesion and the resulting stronger bond.

Without Additive

With 0.1% TARGON® 19



SEM image of the interface of a mortar-cement substrate after subjected to the tensile strength test.

Gypsum-Based Systems

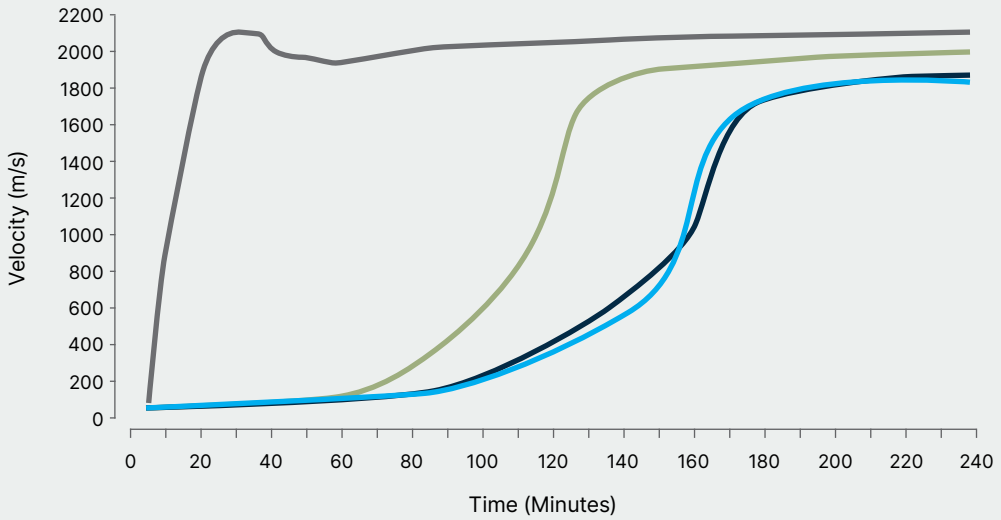
Secondary Retarders for Neutral and Alkaline Systems

Gypsum retarders work by slowing down the chemical crystal formation that causes the plaster to set. As secondary retarders, they need to be used in conjunction with a primary retarder such as citric acid or tartaric acid, to be effective. Our range of TARGON products, TARGON® G2 and TARGON® G3, makes it possible to achieve an even setting and an extended open time between felting and smoothing at a dosage of 0.03% to 0.3%.

Effect of using TARGON® G2 or TARGON® G3 as a secondary retarder

Key:

- Gypsum (20-30 Minutes)
- Gypsum with Citric Acid (120-130 Minutes)
- Gypsum with Citric Acid and TARGON® G2 (150-180 Minutes
- Gypsum with Citric Acid and TARGON® G3 (160-180 Minutes)



Both TARGON® G2 and TARGON® G3 can be used in neutral and alkaline systems.

TARGON® G3 has better hydrophobic properties than TARGON® G2 to remain free flowing after prolonged exposure to humid air. TARGON® G2 and TARGON® G3 have proven themselves for machine applied plasters based on FGD gypsum. When applied in formulations with natural gypsum in some cases a deflocculation can occur due to interaction of the additive with clays. In such cases, the quantities of TARGON® G2/G3 to be added should be kept as low as possible.

Retarders for Premixed Gypsum Plaster Free of Hydrated Lime

Retarders for Neutral Plaster Systems

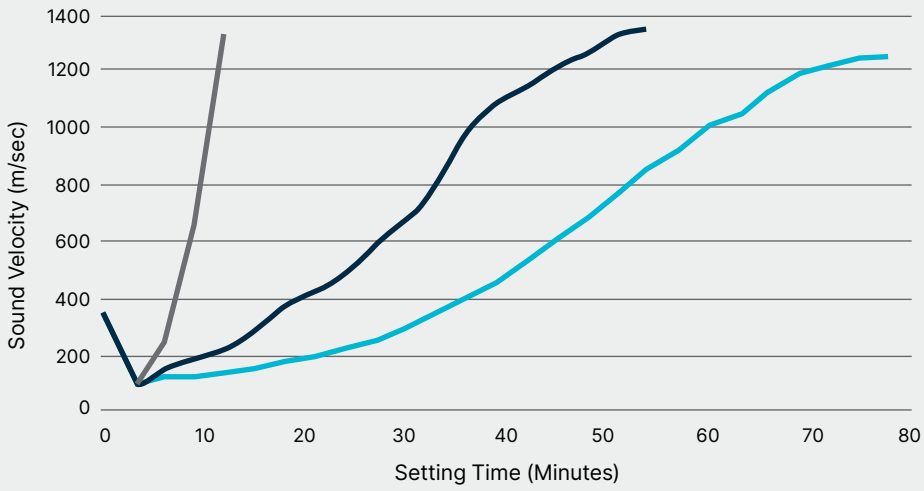
TARGON® GA 1 is our retarder of choice for neutral plaster systems. It is a powder retarder based on sodium phosphate and organic acids. It has a retarding effect in hydrated lime-free gypsum plasters (adhesive and machine plaster) as well as in joint compounds. By increasing the amount used, the curve is flattened, and the setting time is increased. The recommended quantity to be added is between 0.1% and 0.3% based on the dry mixture.

Setting Process of Gypsum Plaster (Lime-Free)

Retarding effect of TARGON® GA1 based on the amount used.

Key:

- Without Retarder
- 0.1% TARGON® GA 1
- 0.2% TARGON® GA 1



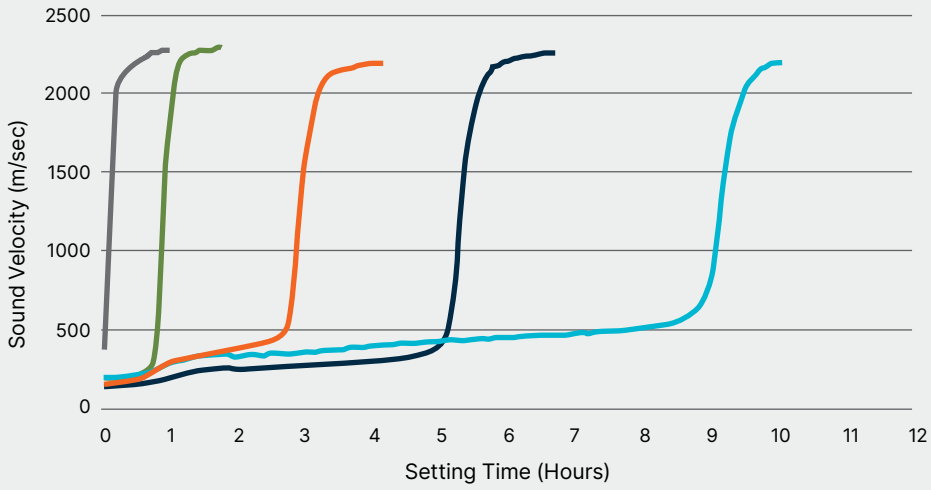
Retarders for Alkaline Plaster Systems

If, on the other hand, a steeper setting process is required, such as for screeds, we recommend TARGON® B 350. This powdery retarder based on a modified polypeptide is characterized by its “steep setting behavior.” By increasing the amount used, the curve is only shifted parallel. The speed of the hardening process remains unchanged.

Setting Curve of TARGON® B 350

Key:

- Without Retarder
- 0.10% TARGON® B 350
- 0.15% TARGON® B 350
- 0.20% TARGON® B 350
- 0.30% TARGON® B 350

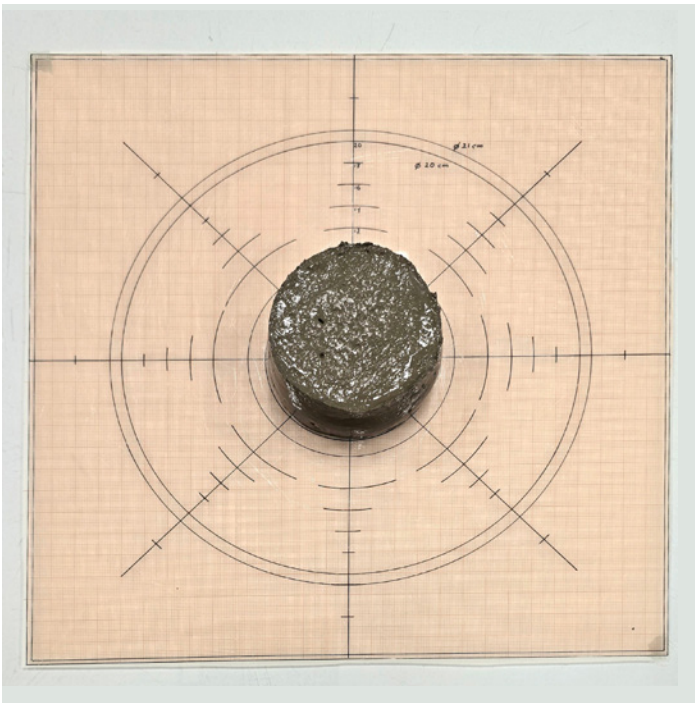


Overview of Gypsum Retarders

Product	Type of Plaster	Dosage Levels	Works in Combination with Citric Acid	Works in Combination with Tartaric Acid
Secondary Retarder				
TARGON® G2/G3	Alkaline/Neutral	0.05 - 0.3%	Yes	Yes
TARGON® G5	Alkaline	0.05 - 0.3%	No	Yes
TARGON® 19	Alkaline	0.05 - 0.3%	No	Yes
Retarder				
TARGON® B 350	Alkaline	0.01 - 0.3%	No Additional Acid Necessary	
TARGON® GA 1	Neutral	0.05 - 0.3%	No Additional Acid Necessary	

Cement-Bound Floor Leveling Compounds

TARGON® FM was specially developed as a setting retarder for floor leveling compounds whose binding agents consist of mixtures of anhydrite or hemihydrate, Portland cement and high alumina cement. These leveling compounds are used to level solid substrates whose surfaces are porous and rough or have scars up to 10 mm deep. TARGON® FM is just as effective in self-leveling mortars as it is in stable leveling compounds.



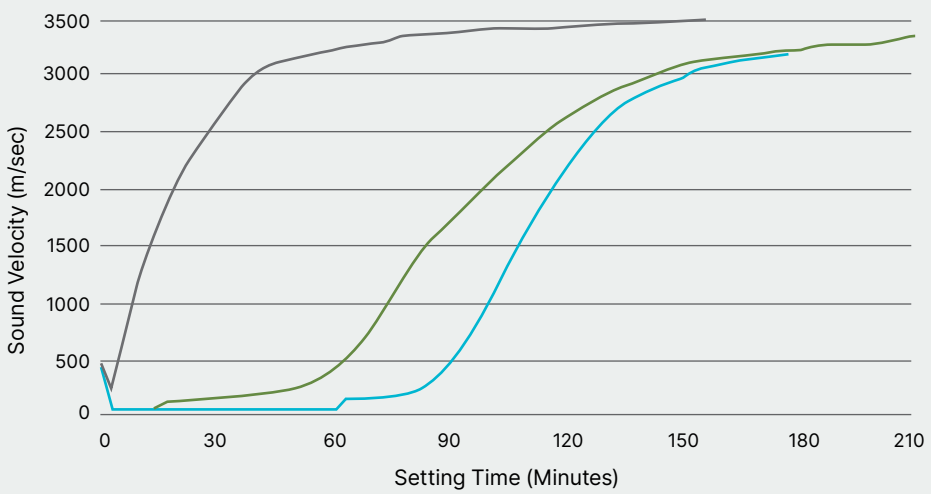
Effect of TARGON® FM (0.2%) in self leveling floor screed: spreading diameter after 30 sec: ~15 mm vs 8 mm without.

The use of conventional retarders increases the workability of cement-based leveling compounds, but at the same time often leads to a disproportionate increase in the setting time. With TARGON® FM, the processing time is extended according to the dosage without affecting the setting characteristic of the leveling compound.

Tunable retarding effect of TARGON® FM

Key:

- Without Retarder
- Common Retarder
- 0.3% TARGON® FM

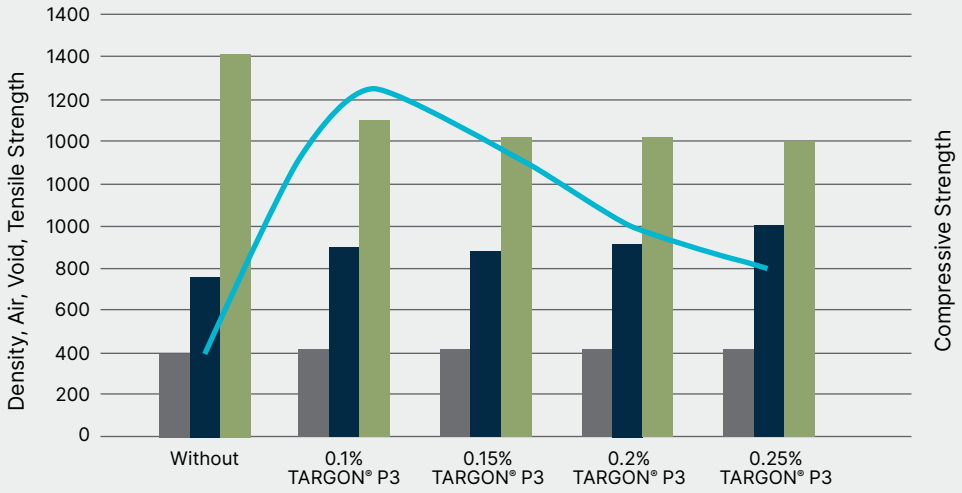


Powder Defoamer

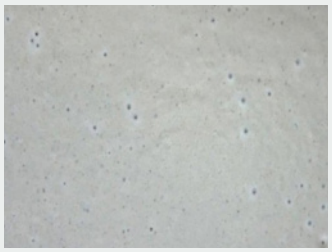
Compressive Strength and Air Content of a Cement Mortar

Key:

- Density, Fresh Mortar (g/cm3)
- Air Void Content (Volume %)
- Bending Tensile Strength (MPa)
- Compressive Strength (MPa)



Effect of the addition of defoamer on the quality of the mortar surface



Without Defoamer

0.1% TARGON® P3

Gypsum-Based Mortar

Gypsum/Cement/ Alumina Cement-Based Mortar

Our Construction Portfolio

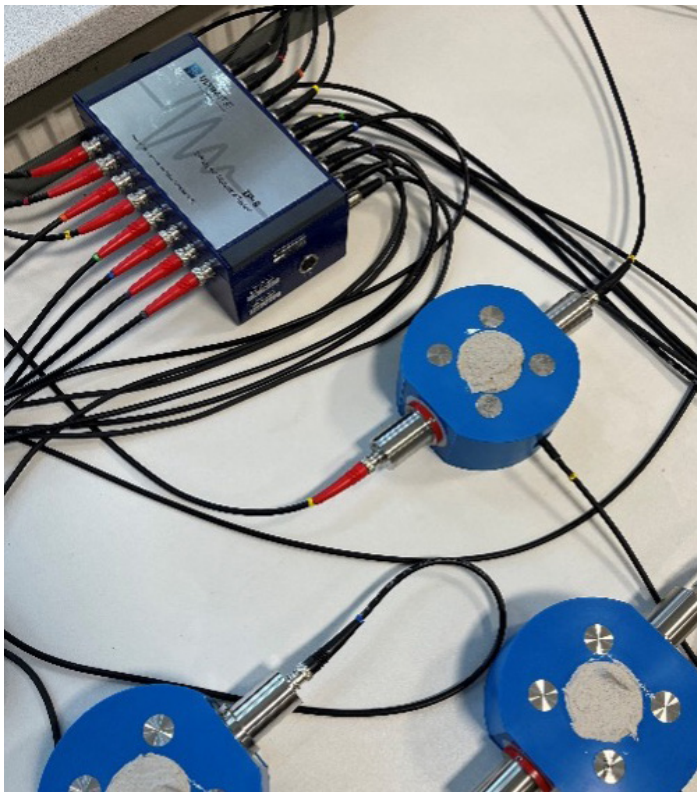
Products	Mode of Action	Description	Form of Delivery	Density (g/l)	pH Value	Recommended Dosage
TARGON® 19	Cement Retarder	Sodium Monofluorophosphate	Powder	1000 - 1200	6.5 - 8.0	0.1 - 0.3%
	Gypsum Retarder	Sodium Monofluorophosphate	Powder	1000 - 1200	6.5 - 8.0	0.05 - 0.3%
TARGON® B 350	Gypsum Retarder	Modified Polypeptide	Powder	800 - 1000	6.5 - 7.5	0.01 - 0.3%
TARGON® GA 1	Gypsum Retarder	Proprietary Mixture Based on Sodium Phosphate, Hydroxypolycarboxylic Acid, Anti-Caking Agent	Powder	1000 - 1200	3.0 - 4.0	0.05 - 0.3%
TARGON® G2	Secondary Gypsum Retarder	Proprietary Mixture Based on Condensed Phosphates, Anti-Caking Agent	Powder	800 - 1200	8.0 - 9.0	0.05 - 0.3%
TARGON® G3	Secondary Gypsum Retarder	Proprietary Mixture Based on Condensed Phosphates, Anti-Caking Agent; Hydrophobic	Powder	1000 - 1300	8.0 - 9.0	0.05 - 0.3%
TARGON® G5	Secondary Gypsum Retarder	Proprietary Mixture Based on Condensed Phosphates	Powder	750 - 950	6.5 - 8.5	0.05 - 0.3%
TARGON® FM	Retarder For Floor Screed With Self Leveling Effect	Proprietary Mixture Based on Sodium Phosphate And Hydroxypolycarboxylic Acid	Powder	700 - 900	4.5 - 5.5	0.1 - 0.3%
TARGON® P3	Powder Defoamer	Proprietary Mixture of Triglycerides, Polyglycols and Emulsifying Agents on an Inorganic Carrier	Powder	400 - 700	6.5 - 7.5	0.05 - 0.2%
LOPON® DA 202	Dispersing Agent	Polyacrylate Low Molecular Weight Ammonium Salt	Liquid	1020 - 1260	7.0 - 8.5	0.2 - 0.4%
LOPON® DA 402	Dispersing Agent	Polyacrylate Medium Molecular Weight Ammonium Salt	Liquid	1100 - 1300	7.0 - 8.5	0.2 - 0.4%
TARGON® 421	Dispersing Agent Containing Retarder	Liquid Ammonium Polycarboxylate	Liquid	1190 - 1250	7.6 - 8.4	0.4 - 1%
TARGON® 83	Dispersing Agent	Sodium Polyacrylate	Powder	500 - 550	7.5 - 9.0	0.05 - 0.2%

Additives for the Ceramic Industry

LOPON® DA 202, LOPON® DA 402, TARGON® 421 and TARGON® 83 are our additives specially developed for ceramic compositions. Our LOPON® DA 202/402 are polyacrylate based ammonium salts of low (DA 202) and medium (402) molecular weight respectively that can be used as dispersing agents in ceramic and plaster formulations. TARGON® 421 is a condenser for special ceramic mixtures (e.g., oxides, steatites, ferrites). Based on neutralized polycarbonic acid this organic liquid can be used to increase the solid content of oxide ceramic mixtures in aqueous suspensions. TARGON® 421 burns without leaving a residue and its steady thermal decomposition avoids crack formation. Finally, our dispersant TARGON® 83 can be used for refractory concrete. More information on these products can be found on our website and on the respective TDSs.

Testing Capabilities

We are committed to helping our customers achieve better products. This includes delivering timely assistance on formulation questions, as well as aiding our customers in testing and evaluating their solutions. Our state-of-the-art laboratories located in Ladenburg, Germany are equipped with all the necessary equipment to provide testing support for the construction industry. Our capabilities include Ultrasound for non-destructive measurements of the curing process, Texture Analyzer for bending tensile strength measurements, Slump to evaluate spread and flow behavior as well as Air Content Tester, to determine the air voids in fresh concrete according to DIN EN 12350-7.



ICL is one of the world's leading fertilizer and specialty chemicals producers committed to fulfilling humanity's ever-evolving needs. Our major production activities are located in Israel, Europe, the US, South America and China, and are supported by major global marketing and logistics networks.

Our Commitment: Successful relationships begin at the product development planning stage and extend through plant trials and product launch. Customers come to us with challenges, and we are dedicated to providing them with solutions. For manufacturers who rely on quality coatings, ICL offers proven performance, long-term corrosion and tannin stain protection, and protection of the world around us.

Technical Service: Our technical support capabilities allow us to help customers achieve better products. We are committed to building our product portfolio and continually exploring and expanding the frontiers of today's coatings technologies. This includes delivering timely assistance on coating formulation questions, aiding formulators in achieving total system compatibility and identifying an optimum inhibitor package to address individual cost and performance targets. We take the problem, analyze the parameters, work jointly with company product experts and create solutions that exceed customer expectations.

Quality / REACH Statement / Responsible Care: As a responsible international supplier of specialty chemicals, ICL is committed to advancing the principles of sustainability in the industries in which we operate. We incorporate quality, health, safety and environment management systems into all phases of the chemical life cycle. We pledge continuous improvement to provide the highest quality of products while protecting the safety of our people, our business partners, and the environment.

ICL is ISO 9001, ISO 14001:2004 and RC 14001:2014 certified. We are committed to our Responsible Care® initiatives and are consistent with the Responsible Care® code of Product Stewardship. We remain fully engaged in the implementation of the European Union's Registration, Evaluation, Authorization and Restriction of Chemicals legislation (REACH). The impact it will have on the future availability of chemicals is of vital importance for ICL, our customers and the entire global chemical industry.

To learn more, visit: www.icl-group.com
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Additional Product Lines

HALOX®: An extensive portfolio of organic and inorganic corrosion and flash rust inhibitors, supplemented by tannin stain inhibitors.

LOPON® & POLYRON®: Dispersing agents and stabilizers specially formulated for silicate and biocide-free paints.

TARGON®: Versatile additives for the construction industry.