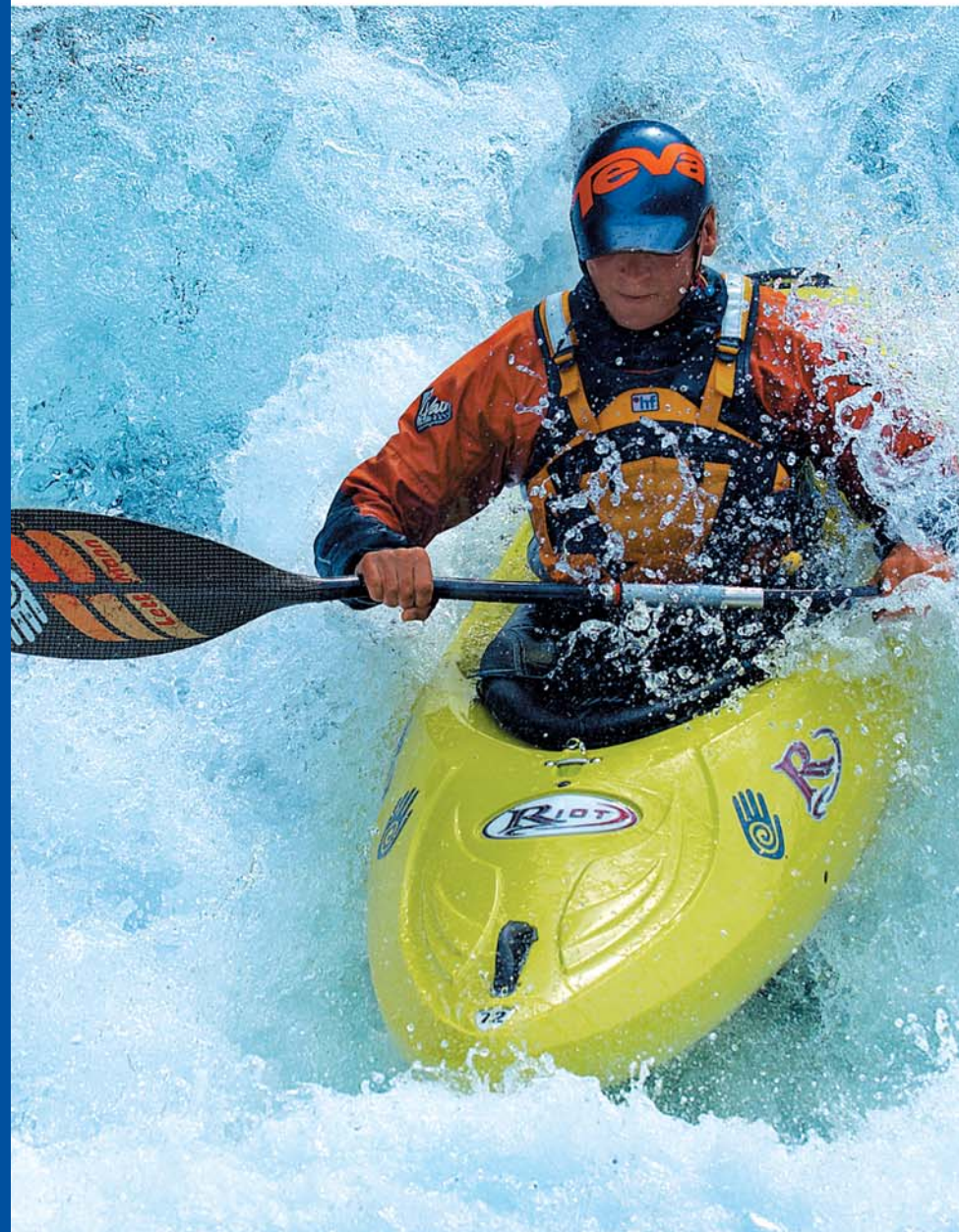


Glenium ACE

for Precast



Admixture Systems Europe

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Zero Energy System™

The Industry Standard for Precast Production

Environment

Precasting is characterized by a great number and variety of types of components and production processes: unreinforced, non-prestressed and prestressed, post-tensioned – just about everything is possible.

Despite all this diversity, the precast industry consistently follows the same goal: the manufacture, with continually increasing productivity, of high-quality concrete components that satisfy the industrial and economical requirements expected. At the same time, precast manufacturers must maintain their profitability in the face of rising materials, labor and equipment costs, during a period of falling prices.

The critical economic factors are multiple utilization of the formwork and the production output. A typical production process includes creation of a concrete mix-design, mixing, concrete placement in the formwork, heat treatment, cutting off tendons where prestressed concrete is involved, striking as well as handling of the completed structural components during delivery and erection.

Concept

The Zero Energy System takes into consideration all the aspects of the production process of precast elements. Apart from eliminating vibrations, reducing energy consumption and labor, the durability of the concrete itself is also enhanced.

The two key elements of the Zero Energy System are Glenium® ACE, a high performance PCE superplasticizer of the latest generation, and RheoMATRIX®, an exclusive BASF viscosity modifying agent.

Smart Dynamic Concrete™ (SDC), a novel V-type self-compacting concrete, provides a concrete mix with exceptional placing characteristics, accelerated cement hydration for early strength development and high-quality concrete.

Energy in the sense of the Zero Energy System comprises more than the direct costs of electricity and oil needed for the operation of a precast plant. It comprises the minimization of all of the energy mobilized in precast production, i.e. stored in the final precast element; not only fossil fuels and electricity must be considered as forms of energy, but also aspects of direct labor, material consumptions and productivity. Thus, the Zero Energy System directly contributes to an environmental responsible, sustainable use of resources.



Glenium ACE

An essential component of the Zero Energy System is **Glenium ACE**, a superplasticizer of the latest generation of polycarboxylate ether (PCE) polymers, especially developed for precast applications.



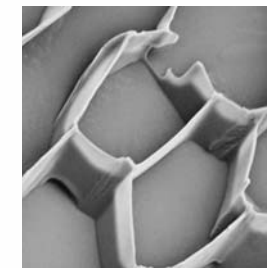
Glenium ACE molecules are rapidly adsorbed on the surface of the cement grains and act through electrostatic and steric repulsion to powerfully disperse the individual particles of cement.

The molecular structure of polycarboxylate ether polymers is essential for the early development of strength. With conventional PCE superplasticizers, the molecules cover the entire surface of the cement grain and build a barrier against contact with water. Therefore, the hydration process takes place slowly.

The unique, proprietary molecular structure of Glenium ACE exposes increased surface of the cement grains to react with water. As a result of this effect, it is possible to obtain earlier development of the heat of hydration, faster development of the hydration products and, as a consequence, higher strengths at very early age. This advantage can even be utilized at low temperatures.

RheoMATRIX

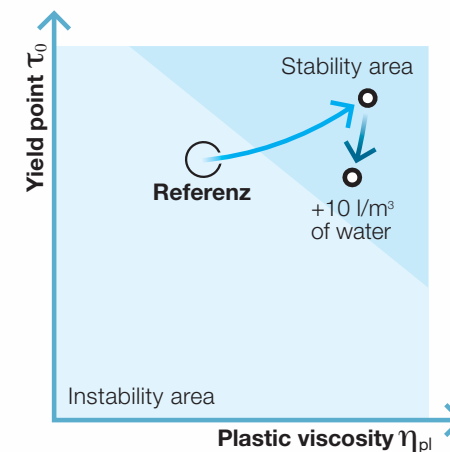
The second essential component of the Zero Energy System is **RheoMATRIX**, an exclusive state-of-the-art viscosity modifying agent (VMA).



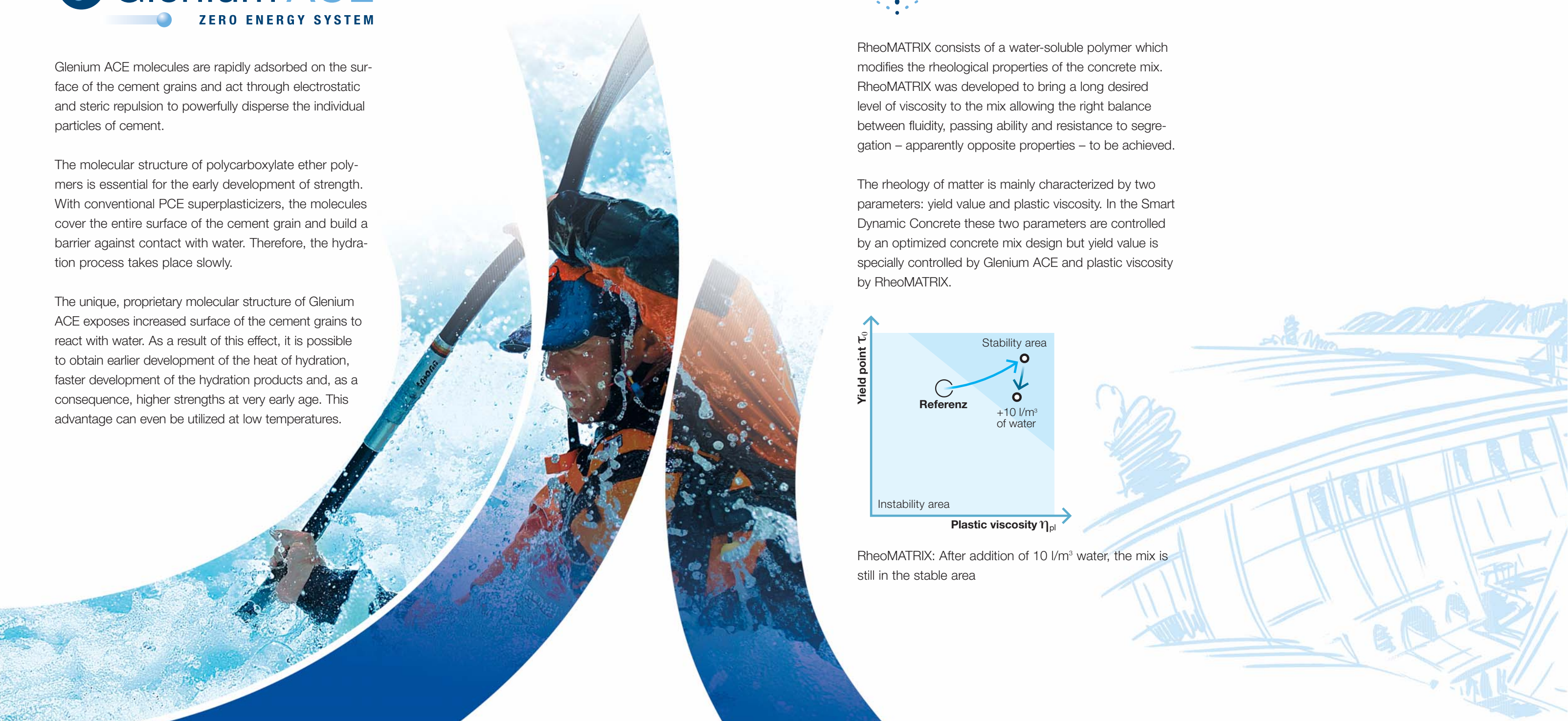
Smart RheoMATRIX polymers which self-organize to a matrix-like structure

RheoMATRIX consists of a water-soluble polymer which modifies the rheological properties of the concrete mix. RheoMATRIX was developed to bring a long desired level of viscosity to the mix allowing the right balance between fluidity, passing ability and resistance to segregation – apparently opposite properties – to be achieved.

The rheology of matter is mainly characterized by two parameters: yield value and plastic viscosity. In the Smart Dynamic Concrete these two parameters are controlled by an optimized concrete mix design but yield value is specially controlled by Glenium ACE and plastic viscosity by RheoMATRIX.



RheoMATRIX: After addition of 10 l/m³ water, the mix is still in the stable area



Benefits of the Zero Energy System

Increased Productivity

Productivity in the precast industry depends directly on the speed at which concrete cures, regardless of which manufacturing process is used.

Glenium ACE, thanks to its unique principle of acting on the cement particles, significantly increases hydration kinetics without disturbing hydrate morphology. The natural exothermic heat produced in the first few

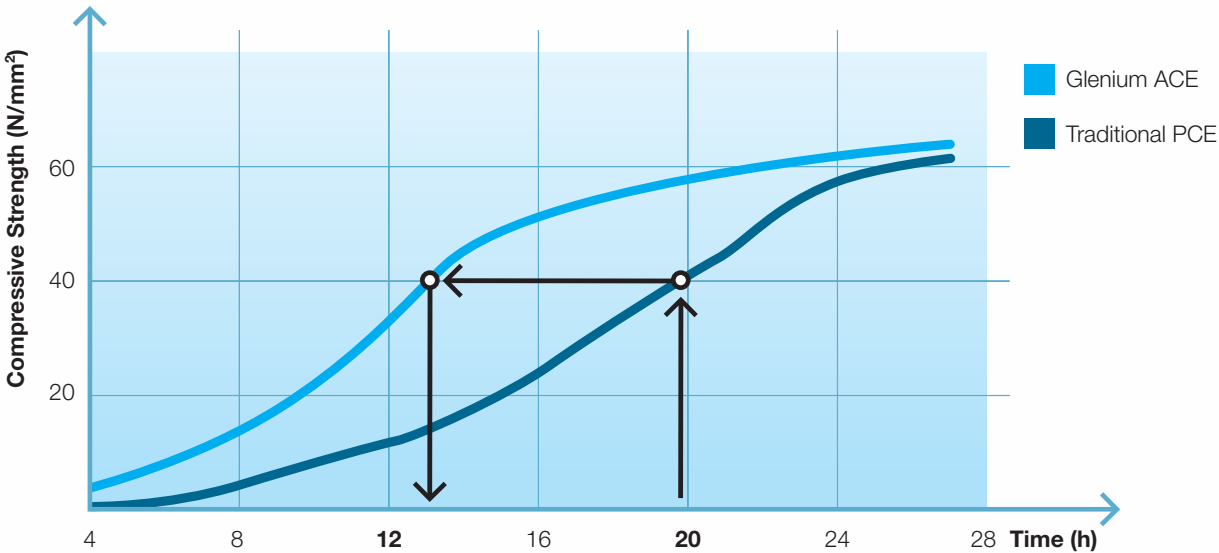
hours is capable of speeding up the crystallization processes, developing faster material strength.

The substantial improvement in performance in comparison with traditional superplasticizers therefore optimizes the efficiency of the mix and reduces the production cycle, potentially doubling output!



Early Strength Development

(fluid concrete 350 kg CEM I 52.5 – 20 °C)



Minimized Heat Curing

The energy required for heat curing is one of the key parameters when calculating the cost of precast concrete elements. It is therefore an important economic factor.

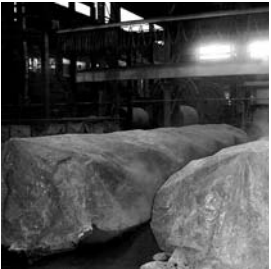
One of the objectives of the Zero Energy System is to optimize the amount of energy required in the production cycle to achieve specification requirements.

The action of the unique Glenium ACE polymer combined with the control of manufacturing and placing parameters

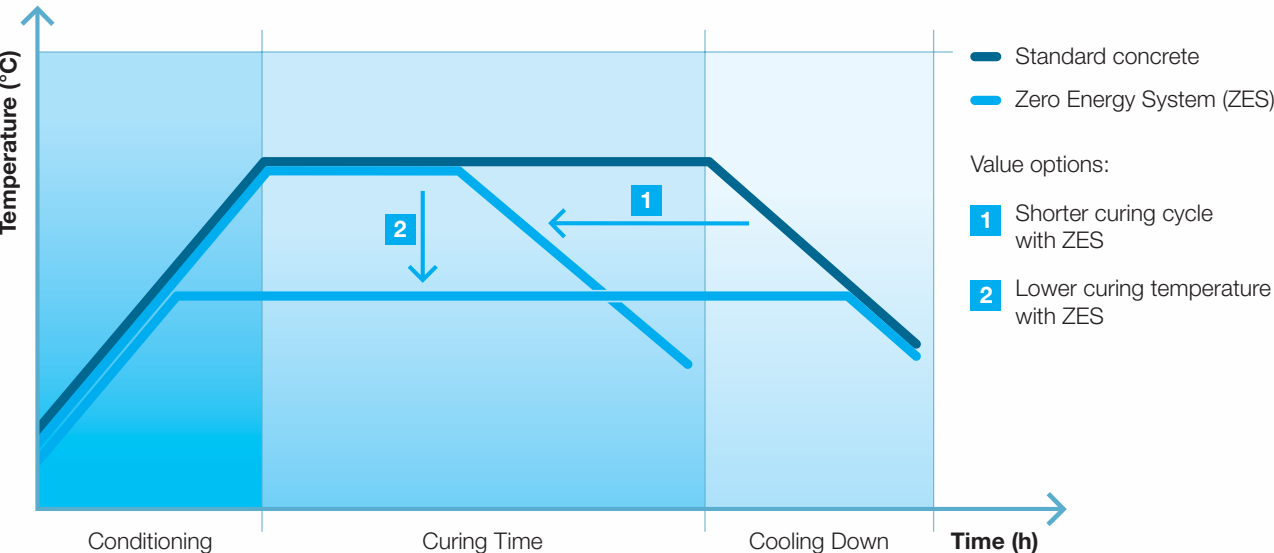
allows optimum use of natural energy for hydration, making it happen sooner!

External energy supplies can therefore be reduced or eliminated, removing the need for heat curing.

This feature of the Zero Energy System not only has economic benefits; it also impacts on the durability of concrete by limiting any microcracks that may result from heat curing (thermal shock, temperature gradient, desiccation, etc.).



Curing Cycle



Benefits of the Zero Energy System

Elimination of Vibration

The energy required to place concrete is a further key factor in calculating the costs of precast elements. However, vibration is also a recognized nuisance factor: noise for workers and nearby residents plus the physical stress for people involved in placing concrete.

One of the objectives of the Zero Energy System is its ability to eliminate the energy required to place precast concrete.

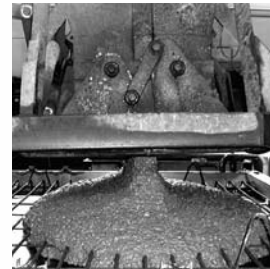
The flow and water reduction action of Glenium ACE, combined with the innovative VMA, enables the robust and direct formulation of self-compacting concretes, which can be placed without vibrations when combined with a compatible manufacturing process.

The Zero Energy System therefore reduces the related costs whilst improving working conditions in the precast concrete plant.

Combination of Benefits

The flexibility of the Zero Energy System ensures the optimum utilization of energy involved to the precasting of concrete elements.

For some manufacturing processes, depending on the cycle time, the ambient temperatures and the composition of the mix, the full benefits of the Zero Energy System can be compounded by combining the effectiveness of Glenium ACE with the technology of self-compacting concrete. Concrete can be placed without vibration, achieving the required performance without the need of heat curing.



Auxiliaries

The Zero Energy System is supported by a full range of dedicated auxiliary products optimized for the Precast industry:

The Rheofinish® range of form release agents (both water and solvent based) allows clean release of cast elements, reducing blow holes without any staining.

The Rheoface® range of surface retarders assures superior surface aesthetics with exposed aggregates at different depth levels.

The Masterkure® range of curing compounds provides highly efficient water retention and user friendly application/removal.

The Zero Energy System is an innovative concept for the precast industry typical of the BASF Construction Chemical's drive for innovation and its desire to work in partnership with the precast industry – for short, we add value to concrete.



Adding Value to Concrete

Deliverables of the Global Leader

As part of the world's largest chemical company, BASF Construction Chemicals is the market leader in the admixtures business. We are committed to engineering quality solutions to drive the concrete industry forward. Through constant research and development into new products, systems, application methods and equipment, we add value to concrete. Our market-segment oriented structure means that you can rely on the proximity of a regional company with the backing of a global group.

▪ Innovative Products

Comprehensive range of admixtures specially engineered for the needs of ready-mix producers, precast operators, contractors and manufactured concrete products producers

▪ Single Source

Complete range of latest technology admixtures for concrete and mortar as well as auxiliary products such as form release agents, curing compounds and surface retarders

▪ Superior Logistics

Easy communication and proficient means of transportation ensured by local organization

▪ Knowledge and Experience

Superior expertise in concrete and mortar technology, its application and design with full local coverage

▪ Value-Added Service

Specification development, mix design and production process optimization support and quality control

▪ Expert Training

Specific programmes for producers and contractors

«Energy is the work necessary in a physical system to change the actual state to a specific future state».

American Heritage Dictionary

