



Living in green buildings

Our sustainable solutions

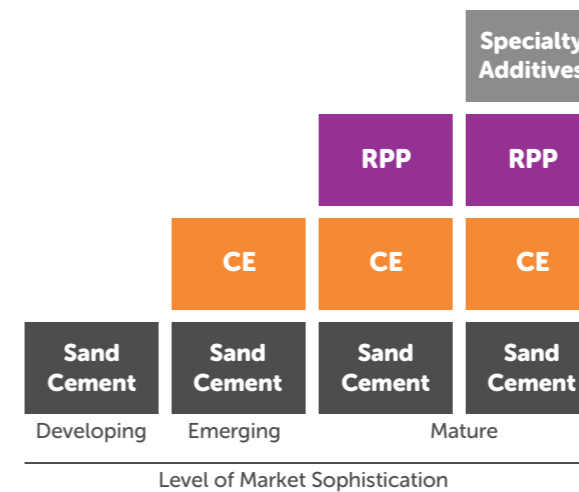
 **Bermocoll**®  **elotex**®

Nouryon

Experience the difference

The rapid pace of change in today's construction industry requires the continuous development of new high performance products which improve the quality and sustainability of building materials.

The dry mix mortar industry has experienced a continuous change over the years in meeting the ever increasing needs of the modern construction industry. The change is most visible in the evolution of the dry mix mortar formulations and several steps in formulation complexity development can be clearly seen:



industry; benefits which we summarize in three pillars and which we integrate into our product development process. It is our understanding that these three pillars also drive the growth of the construction chemicals industry:

- Ecology and prolonged lifetime
- Consistency of Quality
- Efficiency in application and logistics

As an integrated supplier of the essential ingredients for dry mix mortars components (cellulose ethers, redispersible polymer powders and specialty additives). We understand the technical and sustainable benefits these products provide to our customers and to the entire construction



Flooring – smooth surfaces



Building and construction development worldwide stimulates demand for more thin, smooth, and durable flooring materials with low chemical emissions that contribute to a more sustainable future for our planet. As an innovative leader, Nouryon is constantly developing sustainable products with improved performance features that not only reflect the use of energy-efficient manufacturing technologies, but also meeting green building requirements.

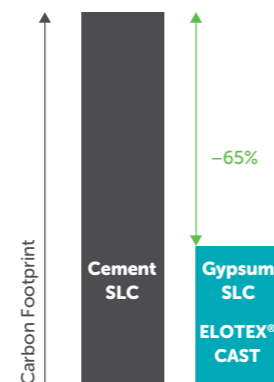
Reducing CO₂ emission

Considering that cement production is highly energy intensive and accounts for around 8% of global carbon dioxide (CO₂) emissions, integrating environmentally friendly building materials, such as gypsum, into building projects helps to reduce greenhouse gas emissions. Gypsum, with its low carbon footprint and large availability, allows builders and architects to achieve green building objectives associated with the transport, fabrication, recycling, and disposal of these building materials.

However, the usage of calcium sulfate like beta-hemihydrate, multiphase gypsum and synthetic anhydride for self-leveling compounds and screeds has been very limited since it was not possible to reach the proper flow and leveling properties. Nouryon provides a unique solution to implement these gypsum types to flooring applications.

ELOTEX® CAST specialty additives in powder form have been launched with a view to facilitate dry mortar producers to use – for the first time – all types of calcium sulfate gypsums. This is a clear step towards sustainable flooring applications and reduction of CO₂ footprint of dry mortar flooring formulations.

Use of gypsum based flooring reduces the CO₂ footprint by 65% compared to cement based systems.



ELOTEX® CAST700 and CAST710 provide multiple benefits:

- The use of sustainable raw materials
- Save time, costs and logistics
- Excellent self-leveling properties
- Ideal rheology profile
- Stabilizing effect and a smooth surface
- Improved strength
- Simplified product formulations and ease of handling

Indoor air quality

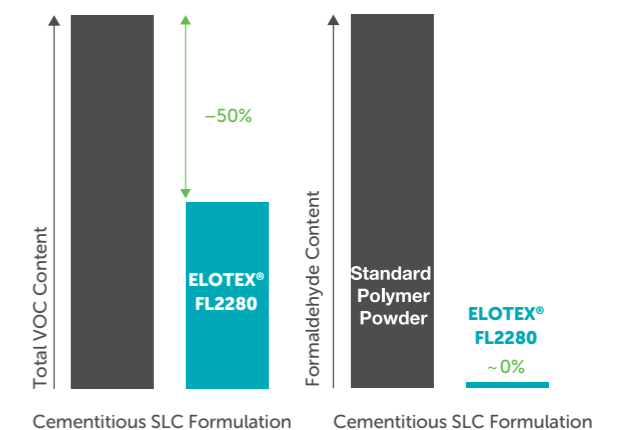
Modern societies, on average, spend the vast majority of their time indoors where they are repeatedly exposed to indoor air pollutants. Floors take up a huge surface area in buildings and thus the emitted Organic Volatile Compounds (VOC) will have an outsized effect on indoor air quality. Our flooring additives will help you reaching the highest indoor environmental requirements and may support your building projects meeting international green building standards, e.g. LEED, BREEAM.

ELOTEX® FL2200 and FL2280 redispersible polymer powders for self-leveling dry mix flooring compounds will ensure excellent self-leveling effect, surface appearance and hardness. Both products are manufactured using formaldehyde free technology, making it an environmentally friendly industrial process, and making the pro-

ducts ideal for indoor use. They enable users to formulate finished products with very low VOC emission in compliance with highest environmental standards, e.g. European eco-labels such as EMICODE® EC1^{PLUS} and Blue Angel.

ELOTEX® FL2200 and FL2280 provide multiple benefits:

- Formaldehyde free RPP product with extremely low VOC emissions
- Allows to formulate according to EMICODE® EC1^{PLUS} requirements
- Excellent leveling effects and high surface abrasion resistance
- Good rheology and workability
- Superior surface appearance
- Good compatibility to differing qualities of other formulation ingredients





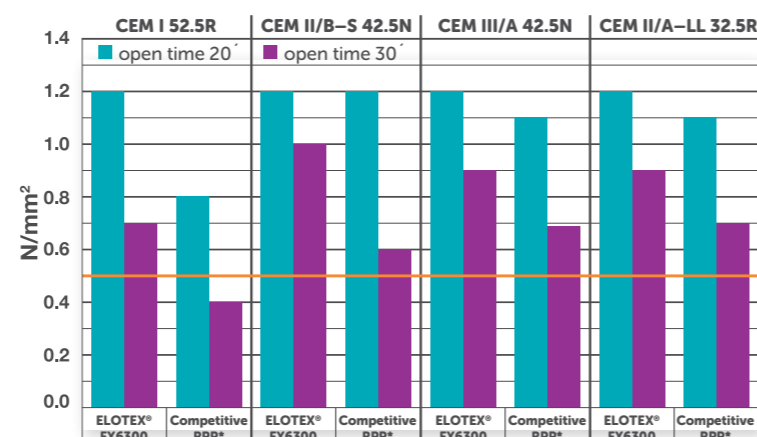
Tiling and Grouting

As the pressure to reduce CO₂ emissions in cement production increases, the trend to produce and use different cement qualities with lower CO₂ footprint intensifies. This trend is visible in the dry mix mortar production by the use of composite cements. Use of Nouryon's redispersible polymer powders and cellulose ethers ensures the same, high performance of tile adhesives, no matter what cement quality is used for the formulation.

The powerful combination of ELOTEX® FX6300 polymer powder and Bermocoll® MT 500 cellulose ether allows you to achieve an easier formulation with high end product performance, no matter what cement quality you use. Here are a few of the extensive opportunities you can reach when using ELOTEX® FX6300 and Bermocoll® MT 500 are:

- Excellent adhesion bond strength onto different substrates including plywood, cement boards, tiles and other materials
- High wet strength adhesion values
- Increase of elastic behavior and increased flexibility
- Prolonged open time of the adhesive ensuring efficient and simple application of the tiles

Furthermore, the combination of ELOTEX® FX6300 and Bermocoll® MT 500 allows you to reach optimum performance on the next generation of Tile Adhesive Mortars. Aligning with our sustainability drive, you are able to obtain longer open time and increased adhesion and meet the new tough ANSI and ISO specifications – ensuring durability and the lifetime of the bond, eliminating the need for frequent refurbishment and saving on raw materials.



* RPP = Redispersible Polymer Powder

Waterproofing

The need for efficient infrastructure is rising, and further challenges like sufficient supply of drinking water or intelligent use of limited water resources are part of everyone's sustainability values. Waterproofing solutions come as a very important aspect for safe and durable construction, as well as environmental protection. Polymer modified dry mix 1-component cementitious waterproofing membranes are state of the art waterproofing solutions. They are durable solutions superior to traditional cement-only and bitumen seals, and demonstrate environmental benefits over 2-components dispersion based systems.

With the use of our ELOTEX® FX2322 in flexible waterproofing membranes you will achieve environmental benefits such as:

- APEO-free binder formulation
- Very low VOC content, allowing to reach EMICODE® EC1^{PLUS} requirements even at higher level of polymer
- Compliance for use in contact with potable water Waterproofing powder dry mix formulations based on ELOTEX® redispersible powders offer:
- Excellent resistance to water and water pressure
- High flexibility and crack bridging performance
- Good abrasion resistance
- Good water vapour permeability

- Good long term weathering characteristics
- Ease of application compared to bitumen based materials, even at low temperatures
- Reduction of waste on site, as no plastic buckets are used as compared to 2-component dispersion based systems
- No use of biocides as there is no need for in-can preservation

Façades – as bright as new



Colour is in our lives, 24/7; we believe that colour has the power to change people's lives; colour is designed to make a positive difference to residents and communities. Whether it is through protecting the colour of the façades, or eliminating cement from powder based decorative coats, Nouryon delivers solutions with a sustainable advantage.

Aligning with our Sustainability program, Nouryon presents technical solutions to help maintain colours as bright as on the first application day for prolonged periods of time.

Our ELOTEX® ERA products, based on a natural resin, help to reduce efflorescence of coloured cement finishes, resulting in less need for building renovation.

Our ELOTEX® SEAL products, based on encapsulated silane which are used in dry mortars, help to keep building surfaces and structures dry. This means more durable applications and less renovation work. ELOTEX® SEAL products are also very efficient against secondary efflorescence. By forming solid long lasting structures in the mortar the water is kept out by still having a breathable structure for the natural vapor flow.

Sustainability performance of the smooth or decorative façade coats can further be increased by replacing dispersion based with powder based dry mortar finishing coats. Further environmental benefit is achieved by eliminating cement from the formulation.

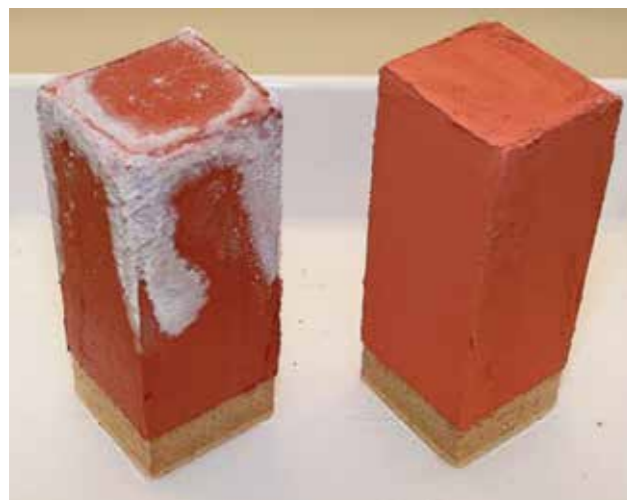
This is where ELOTEX® CF9000 formaldehyde free polymer powder makes the difference. It allows you not only to eliminate cement from your formulations but also ensures high water resistance and weathering (UV) stability of finishing coats.

Cement free decorative finishing coats formulated with ELOTEX® CF9000 are a real sustainable alternative to the ready-to-use pasty systems. A move to dry mortar powder based systems will bring the following benefits:

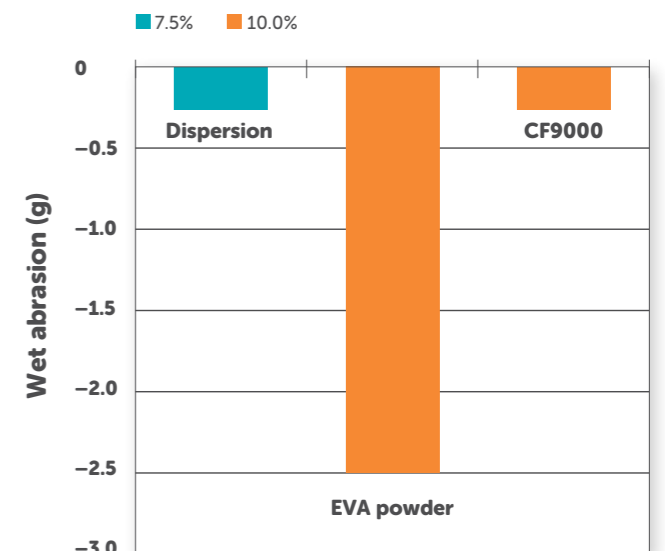
- Less, lighter and lower cost packaging material (paper bags instead of plastic buckets)
- Less waste and easier handling of packaging waste
- Less transportation and storage costs
- No freeze/thaw issues
- No biocides in the final powder formulation (normally needed for in-can preservation)

- Consistency of the finishing coat can be easily varied by the amount of added water – one powder formulation for different application methods (hand or machine)

For smooth cement free finishing render, 10% of ELOTEX® CF9000 leads to an equivalent wet scrub resistance to 7.5% of dispersion (based on polymer solids content in the dispersion). The conventional redispersible polymer powder based on EVA copolymer show 10 fold worse result compared to formaldehyde free acrylic ELOTEX® CF9000 redispersible polymer powder.



Left: Non modified render formulation
Right: Render formulation modified with 0,2 % ELOTEX® ERA





Gypsum

Gypsum is one of the most versatile and sustainable building material. The CO₂ footprint of gypsum is very low, it is naturally occurring, and is also generated as a by-product of power stations, as well as the the fertilizer and detergent industry. Gypsum is infinitely recyclable (albeit some energy is used in its processing and transportation).

Due to its versatility, gypsum based materials allow architects, building owners and decorators to design attractive features for modern interiors. The use of gypsum products also allows earning credits or points towards achieving a higher Green Building Rating. Our commitment to sustainability throughout the globe helps our customers confidently meet the demanding requirements of LEED-certified construction in addition to the added technical performance to differentiate themselves from the commodity product. Gypsum based products are highly sustainable and Nouryon Performance Additives technologies help improve final performance of the gypsum based dry mix mortars.

As an example, ELOTEX® SEAL712 opens more possibilities by widening the areas of applications for gypsum based products. Use of ELOTEX® SEAL712 allows the application of

gypsum based products in indoor wet areas (as an alternative to cementitious systems) and as final coatings with a decorative function. Not only does the use of ELOTEX® SEAL712 open doors for new application areas for gypsum, as an alternative mineral binder to cement, but it also has the following benefits:

- Water repellence and Mass hydrophobic of gypsum products
- Increased durability of gypsum building materials
- Reduced need for priming before painting or wall paper coating (excellent paintability, coatability and repair)

Eco-premium solutions

It won't be long before the world's population reaches nine billion. How will we cope? Can the planet handle so many people? Yes it can, but we have to do things differently: we have to use our ambition and imagination and deal more efficiently with the world's limited resources. We know only too well that our future hinges on our ability to do radically more while using less.

That's why we are working with customers and suppliers to open up infinite possibilities in a finite world. It's our commitment to finding opportunities where there don't appear to be any. We are finding more innovative solutions; we're using more renewable energy and materials and less fossil-based sources; we're focusing more on our entire value chain; and we are actively enhancing lives in the many communities in which we operate as well as inspiring and equipping our employees to recognize new possibilities.

Eco-premium solutions (EPS) are products and processes that offer an improvement in sustainability, delivering either environmental or social benefits. They are measured via a quantitative analysis or a qualitative assessment of performance in seven categories:

- Energy efficiency

- Use of natural resources/raw materials
- Land use
- Emissions and waste
- Risks (e.g. accidents)
- Toxicity
- Health and well-being

When assessed across the entire value chain against currently available solutions in the market, the eco-premium solution must be significantly better in at least one of the above criteria, and not significantly worse in any. Year-on-year progress will be impacted not only by our own improvements, but also by competitor activity and legislation changes. For example, the introduction of new products into the market whose performance is equal to our current range of eco-premium solutions will redefine the standards that we will have to surpass to acquire EPS status.



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Nouryon

We are a global specialty chemicals leader. Markets worldwide rely on our essential chemistry in the manufacture of everyday products such as paper, plastics, building materials, food, pharmaceuticals, and personal care items. Building on our nearly 400-year history, the dedication of our 10,000 employees, and our shared commitment to business growth, strong financial performance, safety, sustainability, and innovation, we have established a world-class business and built strong partnerships with our customers. We operate in over 80 countries around the world and our portfolio of industry-leading brands includes Eka, Bermocoll, Elotex, Dissolvine, and Berol.

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