KEIM Soldalit®-ME

Clean air and beautiful facades – thanks to MiNOx Effect

MiNOx Effect
minimiert NOx

Proof instead of promises!

PREMIUM
is our Standard.

Clean air – a civil right!

Today, our standard of life is largely influenced by high traffic volumes, industrial mass production and high energy consumption – and exactly these factors are the most important causes of air pollution caused by mankind. Traffic plays a key role here.

The problem: Nitrogen oxides, ozone, fine dust.

Many car engines pollute our air with nitrogen oxides, carbon monoxide, organic compounds, sulphur oxides and fine dust. Particularly the nitrogen oxides cause extensive damage to people and to the environment: Nitrogen oxides are an irritant gas, which can have a harmful effect on the respiratory tract. Furthermore, nitrogen oxides can cause increased sensitivity to infectious diseases. And: Nitrogen oxides substantially contribute to the formation of ground-level ozone and acid rain.

§

... People in Germany have a right to clean air ...

Sentence of the Federal Administrative Court of Leipzig from September 2007

In September 2007, a revolutionary sentence passed by the Federal Administrative Court of Leipzig spread through the press: For the first time it was legally established that people in Germany have the right to clean air. Initially, this sentence referred to the fine dust pollution in towns and cities, but it will quickly prove to constitute a precedent for other cases of environmental pollution.

BimSchV[1] – A challenge for cities and communities

Limit values for NO_2 – adherence is becoming increasingly difficult

Air pollution is one of the most urgent challenges, particularly for cities and communities. In the 22nd BImSchV and the 39th BImSchV, the annual average limit value of 40 µg per m^3 air was specified for NO_2 for the protection of human health. The communities concerned must take counter-measures in the event of these limit values being potentially exceeded. These measures mainly comprise bans on driving. However, it is becoming increasingly obvious that traffic-regulating measures alone are not sufficient. And possibilities

of reducing pollution by means of other economically compatible intervention options are hardly given.

New solution approach „Photocatalysis"

It is a good thing that technological development also finds new solutions for environmental problems. The principle of photocatalysis also offers such a solution approach for the reduction of air pollutants such as nitrogen oxides.

[1]BimSchV = Federal Emission Protection Law

Photocatalysis – the "quick-change artist" – what it is and how it works ...

Photocatalysis – nature shows the way

The term photocatalysis describes an operating principle. The word "catalysis" designates the acceleration of a chemical reaction or conversion by a substance (= catalyst), which is not consumed in doing so. The "catalyst" remains stable. The part of the word "photo" means that the substance acting as the catalyst (or "accelerator") is activated by light.

Briefly: In photocatalysis, a substance (="catalyst") is stimulated by light (="photo") to initiate or accelerate a chemical reaction, without being consumed.

Photocatalysis in building materials – a special pigment ensures environmental protection

Photocatalysis can now also be generally used in building materials. Usually, an especially fine particulate titanium dioxide pigment that has the characteristic of initiating photocatalytic processes serves as the catalyst. The photocatalytically active pigment (= catalyst) can degrade organic substances and inorganic gases by so-called oxidation processes. In doing so, these are converted into small, harmless components. This effect can be used for example for the degradation of air pollutants.

Photocatalytic efficiency

Four decisive factors

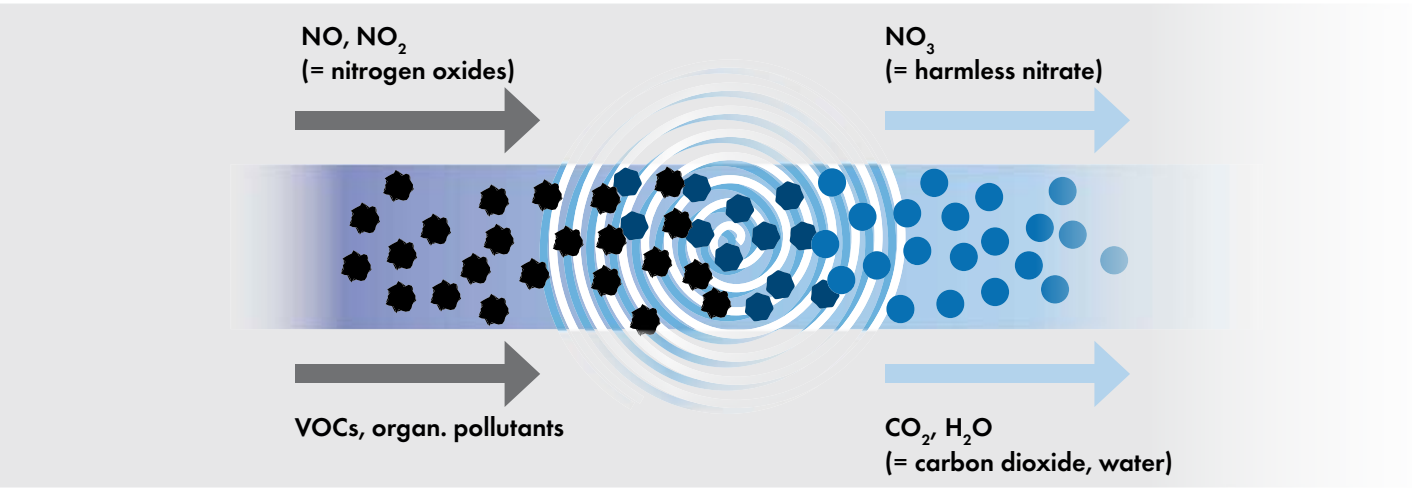
The efficiency of photocatalytic building materials is determined by:

- The quality of the photocatalyst
- The amount of photocatalyst used
- The availability of the photocatalyst on the building material surface
- The temporal availability of the photocatalyst over the service life of the product

Degradation of pollutants

The following pollutant gases and pollutants are degraded:

- Industrial pollution and exhaust fumes such as nitrogen oxides (NO, NO_2).
- Harmful indoor gases like for example out-gassing from furniture or cigarette consumption: VOCs, acetaldehyde, formaldehyde.
- Organic dirt particles or fatty soilings such as stearates.
- Bacteria and mould spores can also be clearly reduced by photocatalysis.



Degradation of pollutant gases by means of photocatalysis (schematic diagram)

The following reaction products are basically created:

- Nitrate
- Carbon dioxide and water

Photocatalysis of paints – a challenge for research and development

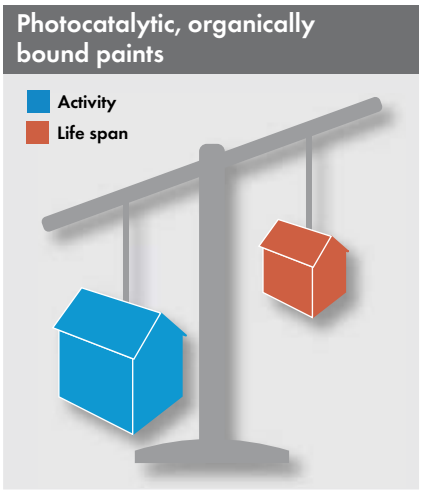
The use of photocatalysis in paints has already been a challenge for the research and development departments of leading paint manufacturers for a long time. Because the integration of these special pigments into conventional paints frequently presents problems: The particular capability of the photocatalyst to decompose organic substances often also includes the decomposition of the organic paint binders. Therefore the most conventional binding agents of acrylate dispersions or silicone resin emulsions and their variants are only suitable for the integration of photocatalytic pigments to a limited extent. The photocatalytic process, virtually having a "self-destruction effect", leads to surface binding agent degradation. The consequences are chalking, premature weathering and a correspondingly much shorter service life of the coating.

The dilemma of organically bound paints

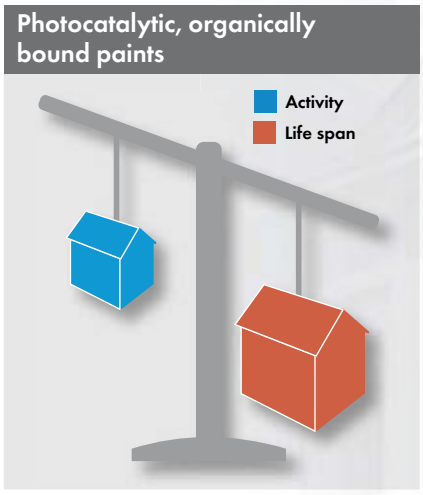
The dilemma of photocatalytic, organically bound paints is therefore specifically:

- Good activity (due to sufficient pigment), but strongly reduced service life (insufficient durability of the paint)
  or
- Good service life, but not optimum activity (too little pigment)

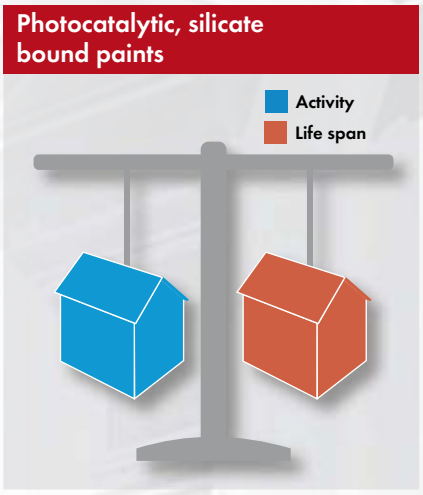
Only the use of inorganic, silicate binding agents (water glass, silica sol, sol silicate) enables the use of effective quantities of photocatalytic titanium dioxide. Because this mineral binding agent is not attacked by the photocatalyst. The open, micro-porous structure of silicate paints also supports the availability of the photocatalyst against approaching pollutant gases due to a correspondingly sized specific surface as a contact surface.



Either ... good activity (sufficient pigments) but, very reduced life span.



or ... good life span but, no optimal activity (insufficient pigments)



Good life span, optimal activity

KEIM Soldalit-ME – Sustainable facade protection with environmental benefit

KEIMFARBEN – long-standing experience pays off

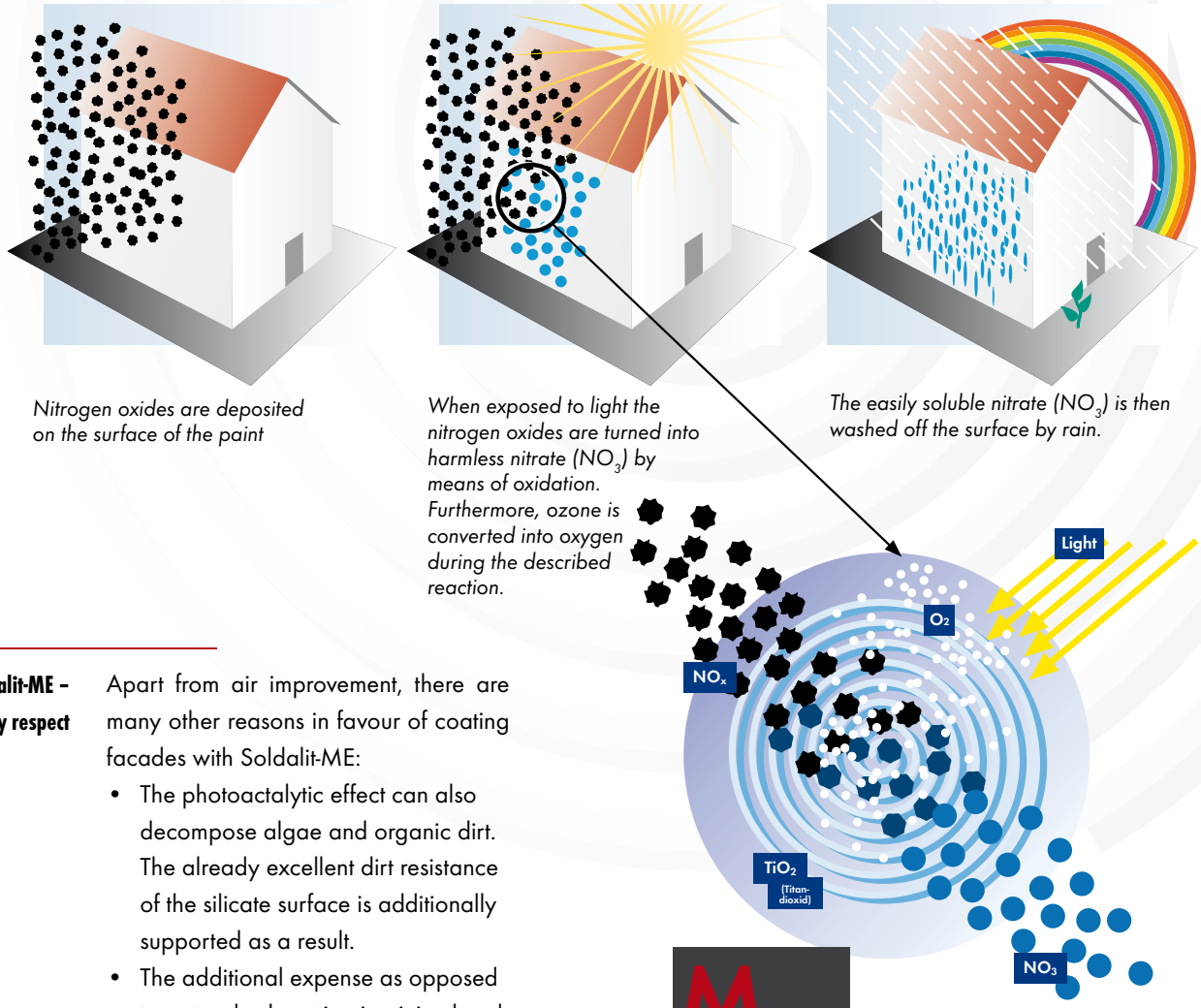
KEIMFARBEN has already been concerned with photocatalytic pigments and the possibilities of integrating them into paint formulations for many years. The company from Diedorf has corresponding long-standing experience in the practical application of such products, both indoors and out – particularly in regions of Europe exposed to high nitrogen oxide levels. Highly active photocatalysts are optimally incorporated into a stable, inorganic binding agent matrix. The result: permanent, photocatalytically effective high-performance coatings.

KEIM Soldalit-ME – Sustainable facade protection with environmentally active benefit

KEIM offers indoor paint and facade paint with the so-called MiNOx effect. "MiNOx" stands for "Minimises NOx" and symbolises the good pollutant-reducing function of the products. While KEIM Ecosil-ME with MiNOx-Effect mainly serves for the degradation of indoor pollutants, KEIM Soldalit-ME creates an extremely economical and efficient option of combining sustainable facade protection with environmentally active benefit and maximum cleanliness.

KEIM Soldalit-ME with MiNOx Effect is a high-quality, mineral facade paint – tremendously durable, lightfast and UV-resistant, with excellent structural properties. And what is more, Soldalit-ME helps to degrade nitrogen oxide.

Degradation of pollutants by means of photocatalysis (schematic diagram)



Nitrogen oxides are deposited on the surface of the paint

When exposed to light the nitrogen oxides are turned into harmless nitrate (NO_3) by means of oxidation. Furthermore, ozone is converted into oxygen during the described reaction.

The easily soluble nitrate (NO_3) is then washed off the surface by rain.

The catalyst titanium dioxide is not consumed. As long as the crystals are supplied with energy by electromagnetic waves (light), the process remains active.

KEIM Soldalit-ME – clean in every respect

Apart from air improvement, there are many other reasons in favour of coating facades with Soldalit-ME:

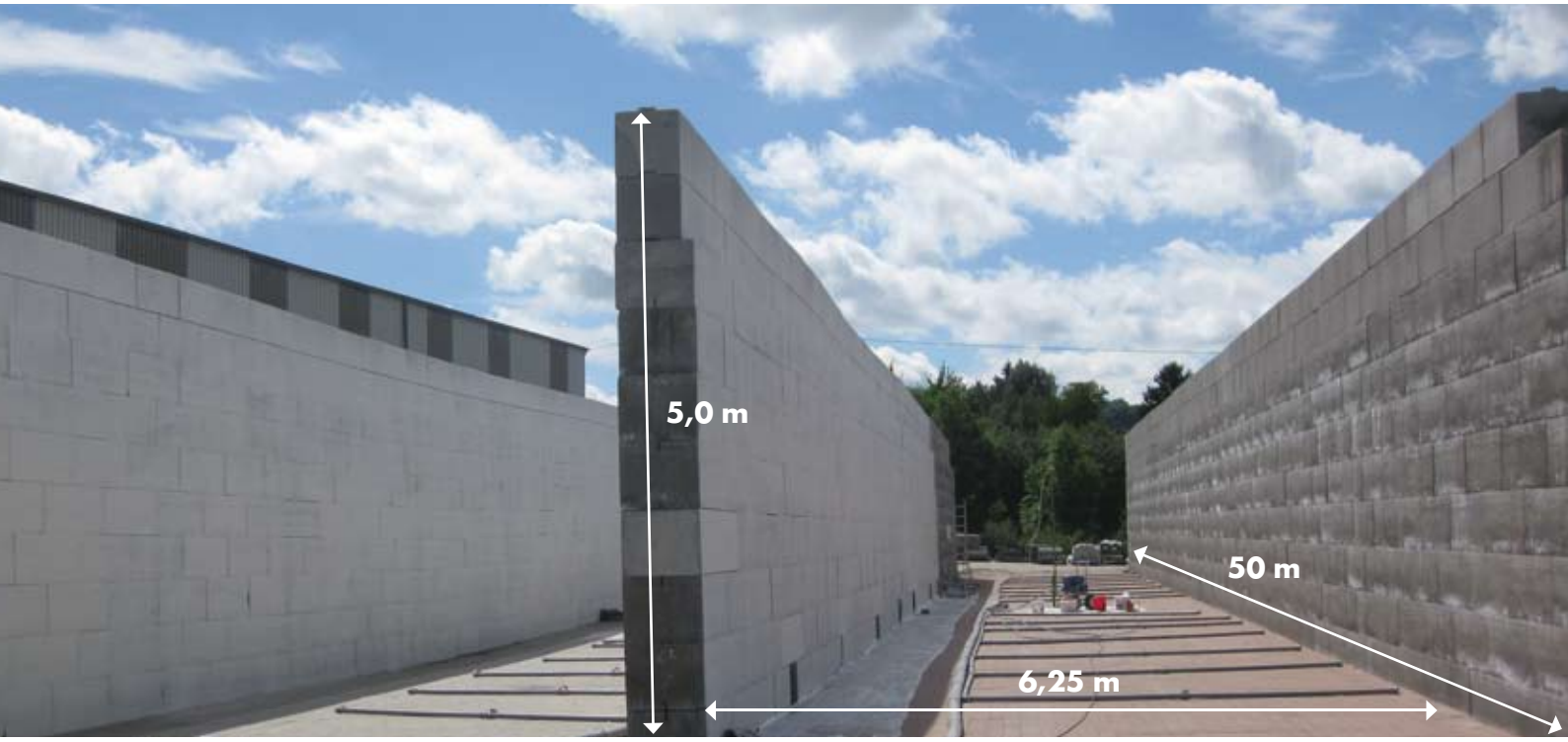
- The photoactalytic effect can also decompose algae and organic dirt. The already excellent dirt resistance of the silicate surface is additionally supported as a result.
- The additional expense as opposed to a standard coating is minimal and brings additional benefit – a plus for people and for the environment.

Rely on Soldalit-ME and make use of the performance spectrum of this high-quality sol-silicate paint for permanent protection, for a refined, mineral facade finish with its permanently clean and colour-stable appearance – and also for more clean air, too!

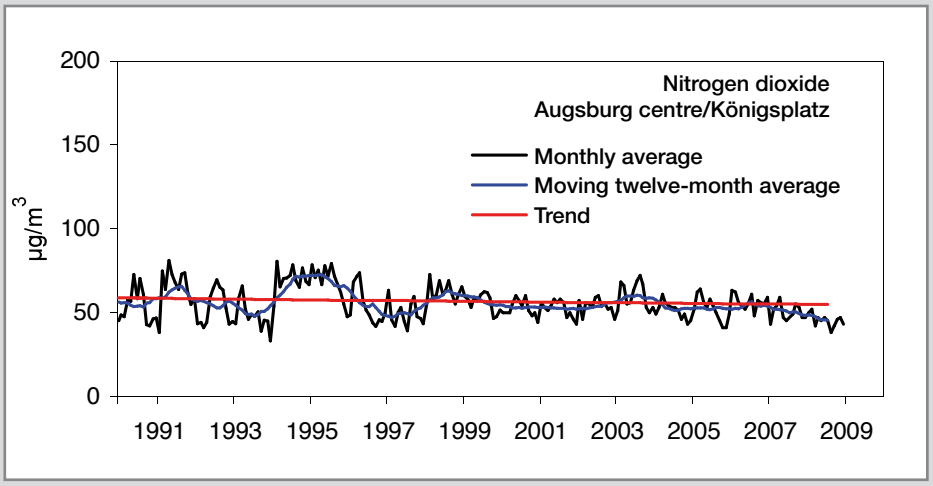
KEIM Soldalit-ME – Tested technology, reliable effect

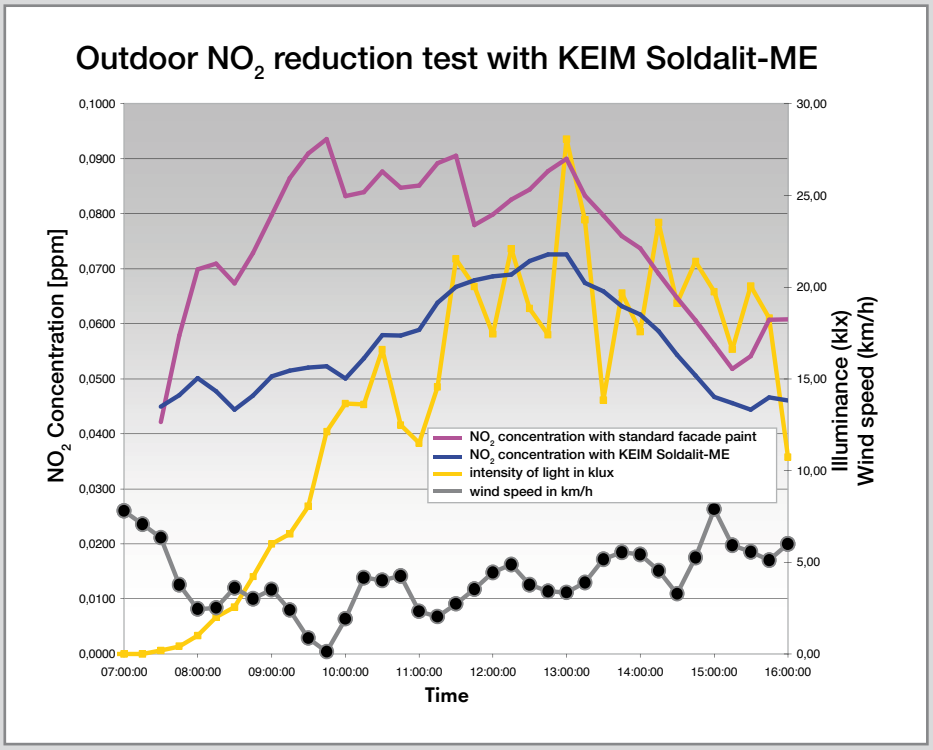
The MiNOx Effect – tested for many years and found to be good

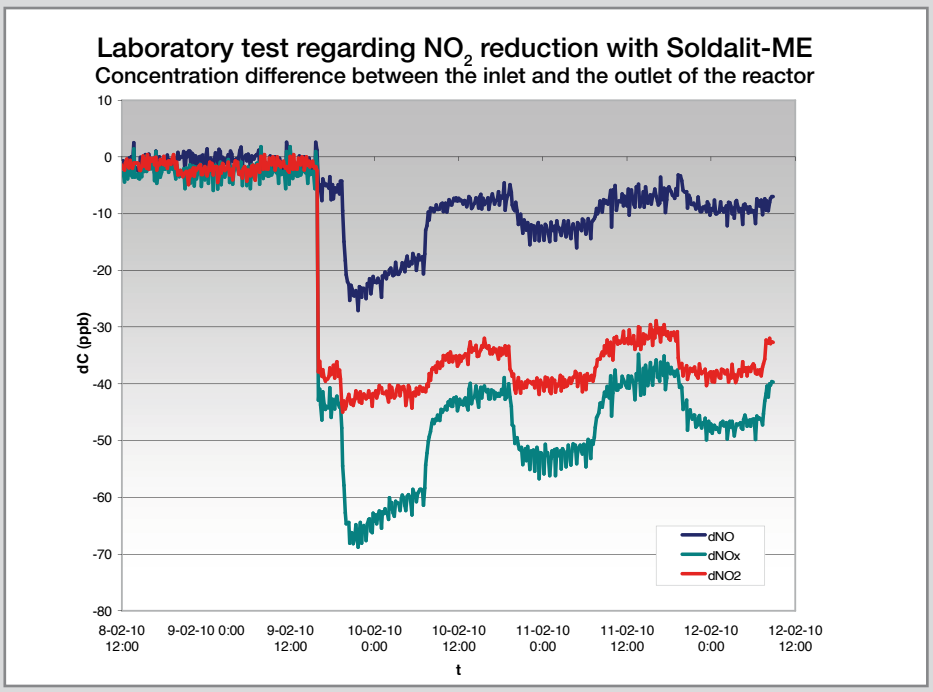
The KEIM products with MiNOx Effect have been tested over many years and examined for their function. And these tests have confirmed: Soldalit-ME clearly reduces pollutant gases – not only in laboratory tests. Soldalit-ME was also tested under practical conditions. In the so-called street canyon, The photocatalytically active paints from KEIMFarben do verifiably convert harmful nitrogen oxides from the air into harmless nitrates.



Soldalit-ME was tested outdoors in direct comparison with other standard facade paints: In doing so, the canyon was continuously exposed to nitrogen oxides and the pollutant gas concentration in both canyons was measured at a height of 3 m over a longer period of time. The degradation rates in practice are strongly influenced by wind strength and wind direction as well as by solar radiation. In the defined period, Soldalit-ME leads to NO_2 reduction rates from 10 – 50 % in the street canyon.







Top diagram: Nitrogen oxide concentration over time, source: State Institute of Environmental Protection of Bavaria

Picture left: Test setup of comparative outdoor tests in the "street canyon"

Centre diagram: Results of the NO_2 reduction in the "street canyon" test FCN

Diagram, bottom: Results of laboratory examinations regarding the efficiency of Soldalit-ME for the degradation of nitrogen oxides by TNO in Holland (report no.: 034-UT-2010-01685)

KEIM Soldalit-ME ...

- the photocatalytic paint for clean air and beautiful facades
- verifiably converts harmful nitrogen oxides into harmless nitrates
- sustainable facade protection with environmental benefit

MiNOx Effect
minimiert NOx

zukunftsweisend umweltaktiv
Initiative photoaktive Baustoffe

Eine Initiative der Marken
BRAAS FCN KEIM

KEIMFARBEN
GmbH & Co. KG

Keimstraße 16
D-86420 Diedorf
Fon +49 (0)821 4802-0
Fax +49 (0)821 4802-210

www.keimfarben.de

Frederik-Ipsen-Straße 6
D-15926 Luckau
Fon +49 (0)35456 676-0
Fax +49 (0)35456 676-38

info@keimfarben.de

KEIMFARBEN
consistently mineral

Stand 11/2010 engl.