Sorbacal®

See clearly now

Sorbacal® SP

The obligation to protect and preserve our environment, together with the need to curb energy use, are the two biggest challenges facing us all in the 21st century. How can industrial operators meet those challenges without compromising their ability to carry out their functions efficiently?

Lhoist is the perfect partner to help you !

The use of a wider range of fuels, ranging from natural solid fuels to urban waste and alternative residue-derived fuels, provides part of the answer. Partnership with Lhoist Group, one of the world's leading manufacturers of lime and lime-based products provides another part of the answer.

- Headquarters
- Divisional Headquarters
- Sales Office
- R&D Centre
- Burnt products
- Unburnt products

Pollutants (Nm³ ; dry gas at 11%O_2)		Unit	Dir. 2000/76 For waste incineration		
			100% daily average	100% average value for 1/2 h	97% average value for 1/2 h
Dust		mg/Nm³	10	30	10
Organic substances, expressed as CO			10	20	10
SO_2			50	200	50
HCl			10	60	10
HF			1	4	2
NO_x	Existing units < 6tph		400		
	Existing units > 6tph or new intallations		200	400	200
PCDD/PCDF dioxins and furans		ng TEQ/ Nm³	0,1		
Heavy metals			Average value for 1/2h min. to 8h max.		
			100%	97%	
Hg		mg/Nm³	0,05	0,1	
Cd+Tl			0,05	0,1	
Sb+As+Pb+Cr+Co +Cu+Mn+Ni+V			0,5	1	

Contents

Whatever the industrial sector – municipal waste incineration, glass making, the steel industry, or mineral extraction - the common waste by-product of the industrial process is emission discharged into the atmosphere. The amount and toxicity of flue gas emissions is increasingly being curbed by legislation, in particular the Integrated Pollution Prevention and Control Directive.

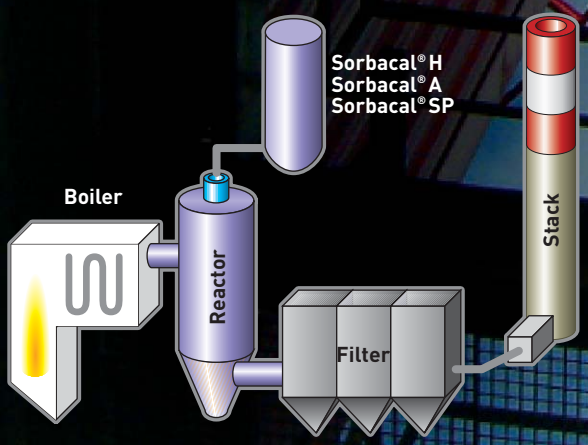
The answer from Lhoist Group, the expert in FGT, is Sorbacal® SP, a unique lime-based flue gas treatment. Use of Sorbacal® SP as an alternative to expensive and extensive capital investment in new FGT plant allows industrial users to remain competitive in the globalised marketplace.

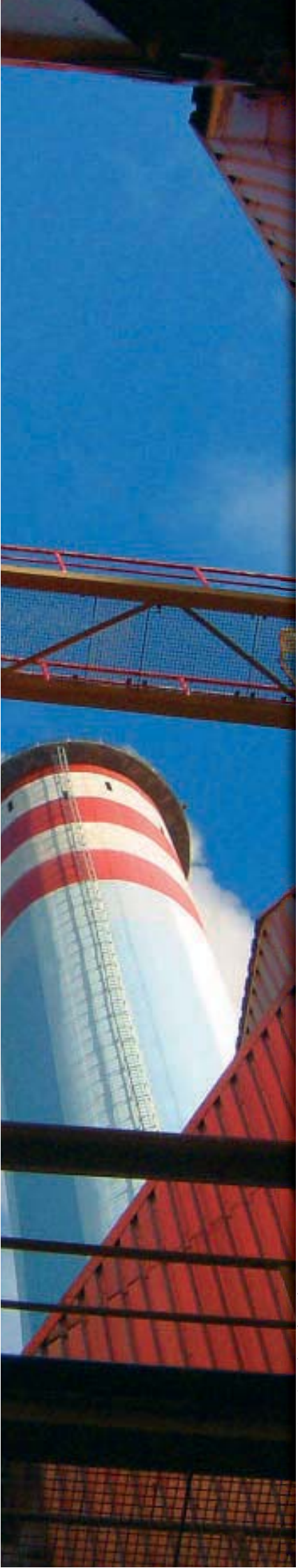
Dry Flue Gas Treatment
From simple to easy

Dry Flue Gas Treatment (FGT) has become the predominant solution for modern flue gas facilities. The basic FGT consists of a filtration unit combined with an injection of dry hydrated lime, Sorbacal® SP from Lhoist Group. The actual acid gas neutralisation takes place in the duct and on the surface of the filter bags.

Benefits of the dry FGT include:

- Low investment cost
- Simplicity of design and operation
- Product is ready for use
- Ability to meet more stringent emission limits in the future
- Low ground footprint
- Lowest consumption of electricity
- Flexible operation with regard to temperature and capacity
- Simple and easy stabilisation of dry residues.



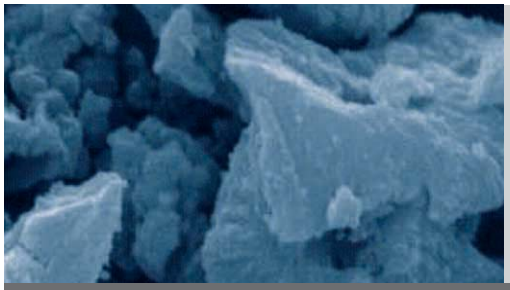


Sorbacal® SP

a top quality hydrated lime

For the dry process, dedicated to achieve the latest SO_2 - HCl - HF emission limits

Sorbacal® SP is a top quality hydrated lime dry process designed to achieve the latest SO_2 (sulphur oxide), HCl (hydrogen chloride) and HF (hydrogen fluoride) emission limits. This high performance lime has been developed by the Lhoist Group to increase the flexibility and effectiveness of the dry process. Due to its large specific surface area and high porous volume, Sorbacal® SP achieves superior pollutant removal and reduces operating costs.



Standard hydrated lime

Sorbacal® SP

	Standard hydrated lime	Sorbacal® SP
Purity (Content of $Ca(OH)_2$)	> 90%	> 93%
BET Specific surface area	< 18 m²/g	> 40 m²/g
Total pore volume (0-1000 Å)	< 0.10 cm³/g	> 0.20 cm³/g
d50	4-6 µm	5-8 µm

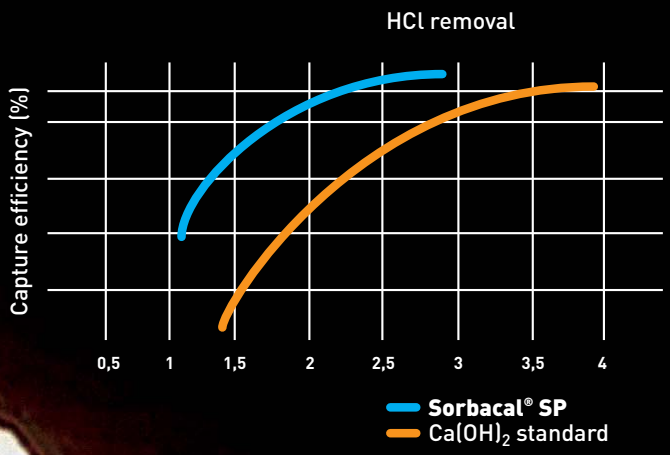
Benefits
of the high specific surface area and large pore volume of Sorbacal® SP

Reduction of the fresh absorbent dosage

The high specific surface area (up to three times higher than normal hydrated lime), combined with the higher pore volume, results in a reduction of up to 50 % in the amount of Sorbacal® SP used when compared to standard hydrated lime.

Reduction of the residue generation

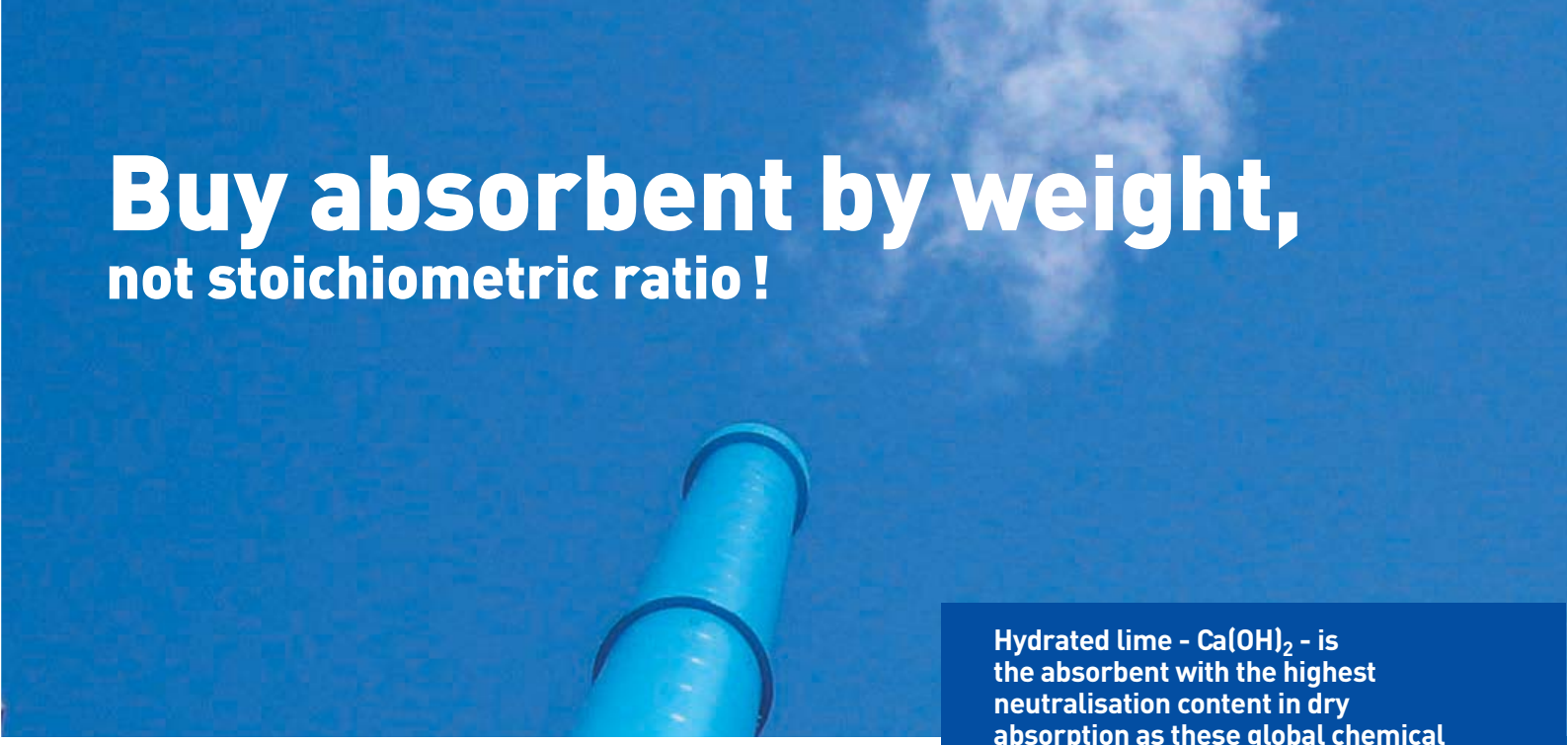
As a result, dry processes using Sorbacal® SP instead of standard hydrated lime generate significantly less flue gas cleaning residues.



Extension of dry process to new temperature zones

The high efficiency of Sorbacal® SP in a wide temperature zone ranging from 100 to 400°C brings about a complete re-engineering of the FGT process. Specially welcome in the case of a SCR Denox low temperature or high temperature electrostatic precipitator in the industrial market.

Buy absorbent by weight,
not stoichiometric ratio !



Hydrated lime - $Ca(OH)_2$ - is the absorbent with the highest neutralisation content in dry absorption as these global chemical reactions show:

Desulphurisation

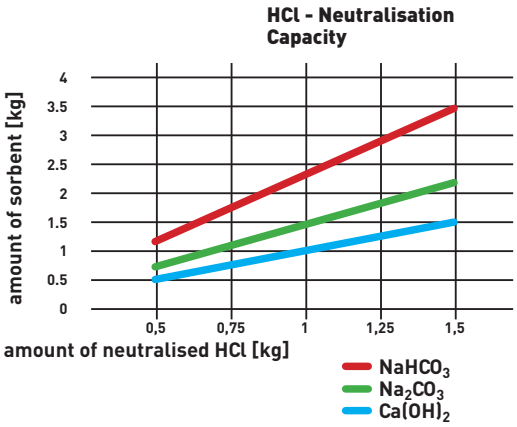
$Ca(OH)_2 + SO_2 + ½\ O_2 > CaSO_4 + H_2O$

Halogenated acids removal

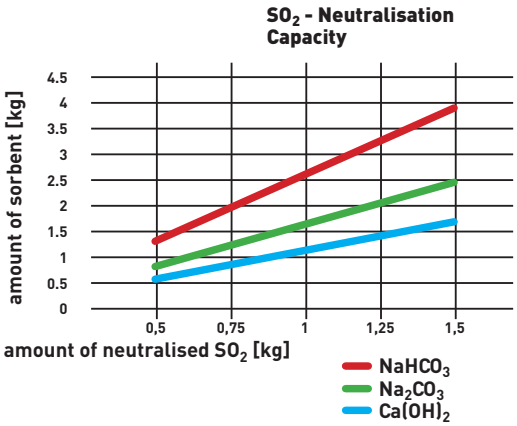
$Ca(OH)_2 + 2\ HCl > CaCl_2 + 2\ H_2O$

$Ca(OH)_2 + 2\ HF > CaF_2 + 2\ H_2O$

From theory...



1 kg of HCl can be neutralised by 1 kg of $Ca(OH)_2$



1 kg of SO_2 can be neutralised by 1.2 kg of $Ca(OH)_2$

... to practice

As hydrated lime has the highest neutralisation capacity, and considering the realistic values achieved by many users in practice, less than 2 kg of Sorbacal® SP should be sufficient to neutralise 1 kg of HCl. Less than 3 kg of Sorbacal® SP should be sufficient to neutralise 1 kg of SO_2.

Consequently, in the case of urban waste incineration for example, the lime dosage varies from 8 to 18 kg per ton of garbage (depending on the chlorine and sulphur load of the waste).

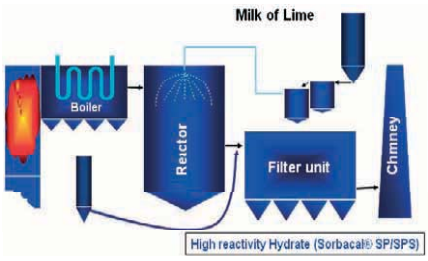
Sorbacal® SP

easily adapts to your process

Multiple injection points to optimise the performance

By injecting Sorbacal® SP at several points, specially selected by Lhoist's service team, and starting from the same silo (meaning no additional investment), we can further optimise performance and reduce consumption.

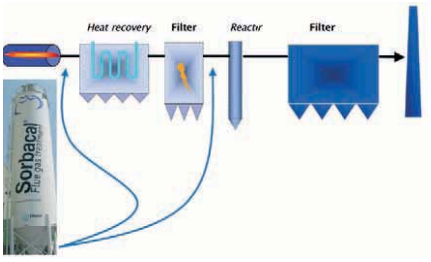
Combination of dry Sorbacal® SP injection and semi-wet process (called ¾ dry process, MKT or Multi purgo)



By combining Sorbacal® SP injection with a semi-wet process using milk of lime atomiser (based on Sorbacal® Q – quicklime - for example), we can optimise performance and maximise savings. The semi-wet process using milk of lime prepared from quicklime is renowned for its low cost of absorbency but can experience some limitations to cope with unsteady flue gas conditions such as flow rate, acid gases concentration and specific flue gas temperature issues. Sorbacal® SP injection broadens the typical operating conditions of the semi-wet process and boosts the performance of the flue gas treatment with only marginal investment needed.

Ultra high temperature injection

The outstanding performance of Sorbacal® SP injection in the temperature range of 850 to 1050°C on SO_2 removal means that more than 90 % of the SO_2 can be removed. This selective



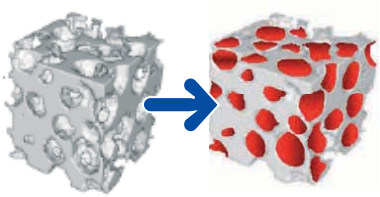
SO_2 removal widens the possibilities of combined multiple point injection. In particular, the first stage injection at ultra high temperature captures the majority of the SO_2 and then the second stage injection of additional Sorbacal® SP before the filter, after the cooling process captures the HCl, HF and the residual SO_2.

Sorbacal® SP in a dry process with residue recirculation reduces the recycling rate and improves performance

Several dry flue gas processes designed for standard hydrated lime are based on the recycling of a large quantity of absorbents and operate at low temperatures. It is possible to reduce the recirculation rate and improve the removal performance by using Sorbacal® SP.

Sorbacal® SPS: especially for sulphur removal

Sorbacal® SPS improves performance on SO_2 removal at temperatures between 150°C and 350°C.



Sorbacal® SP Sorbacal® SPS

Sorbacal® SPS has the same physicochemical characteristics as Sorbacal® SP but is doped to improve the affinity of lime with SO_2.

Sorbacal® SP
...use it now !

"On–demand performance" using Sorbacal® SP

Sorbacal® SP enables the user to comprehensively tune the performance as a function of the evolution of flue gas conditions such as volume of flue gas and concentration of the pollutants or following the tightening of legislation without additional investment. 25% to more than 99% removal are possible.

Ready for today

As Sorbacal® SP is delivered to site as a free flowing powder, it is ready to use without needing additional cost intensive treatment such as milling. Sorbacal® SP can be injected in a wide range of dosage rates without any modification of the injection device or extra investment.

Ready for the future

With Sorbacal® SP, daily average emissions lower than 2 mg/Nm³ HCl and lower than 8 mg/Nm³ SO_2 have already been achieved in municipal waste incinerators.

A ZERO investment and risk-free move

Sorbacal® SP is the perfect substitute to normal hydrated lime in a plant facing the evolution of the standards. Without any investment, a simple replacement of the current normal hydrated lime using the same silo boosts the performances of your dry process.

A comprehensive European production network

Today, Sorbacal® SP is produced in six plants throughout Europe and the capacity is continuously being adapted to market needs. Production plants are located in:

- Belgium
- France (2)
- Germany
- Czech Republic
- United Kingdom

Sorbacal® SP, a worldwide success

Sorbacal® SP is widely considered to be the best lime for dry absorption by hundreds of customers in three continents. Furthermore Sorbacal® SP is also produced in three plants in Japan.

Laboratory analysis

Test equipments

Mobile Measurement Unit

On site analytical assistance with our mobile laboratories

MATEO system

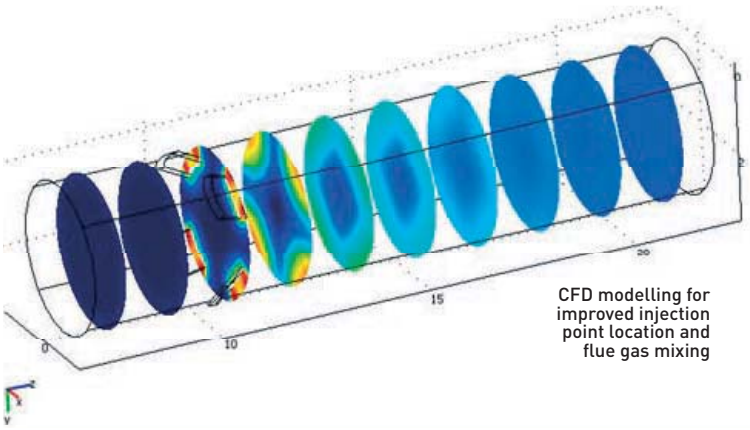
Storage facilities

Sorbacal® SP benefits from an extended range of services to ensure optimal cost savings

Teams of experienced engineers ensure the continuous development of the products and the optimal implementation of the Sorbacal® SP process.

Lhoist benefits from many market experts in each country with more than 20 years of experience in the field of Flue Gas Treatment.

Skilled service teams



CFD modelling for improved injection point location and flue gas mixing

The teams provide a full assistance package

Our teams provide a full assistance package comprising:

Expertise

From initial help on the design of the plant to complete process recommendations, our expertise encompasses:

- Fully equipped laboratory
- Modelling programmes
- Testing and analysis.

Customer assistance

Integrated technical support from test equipment to trial follow-up.

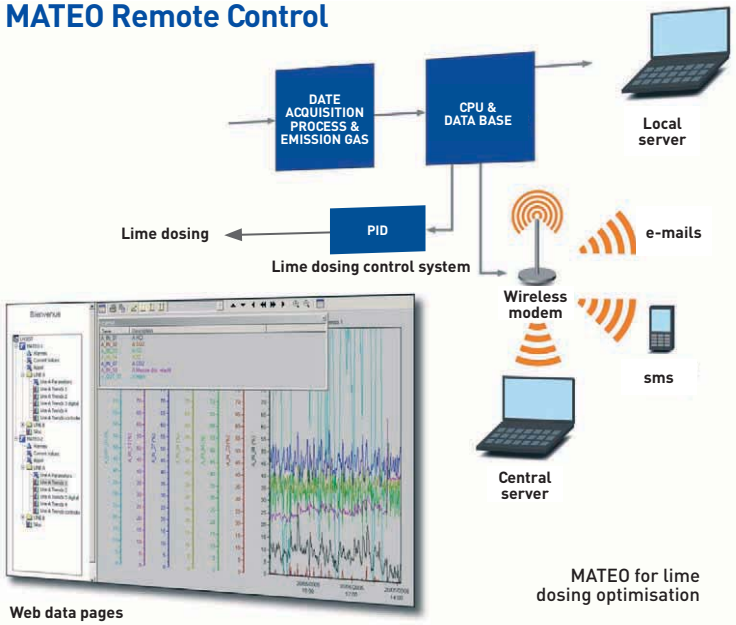
Technical assistance to contractors and plant operators

Comprises support from initial start-up to commissioning. Two mobile laboratories, fully equipped with state-of-the-art continuous acid gas analysers, provide professional assessment of the operating conditions and performance of the flue gas treatment to be carried out.

Optimisation

Optimisation of the global flue gas treatment performance is carried out.

MATEO Remote Control



MATEO for lime dosing optimisation

Frequently asked questions

Sorbacal®
see clearly now

How can I efficiently remove dioxins, furans and heavy metals ?

With Minsorb™, a new product complementary to the Lhoist range of blended products. Minsorb™ comprises a family of mineral absorbents especially dedicated to remove dioxins and furans as well as volatile pollutants such as heavy metals including Hg and Cd. Minsorb™ is non flammable and non explosive and sidesteps ATEX legislation constraints applicable to active carbon. Minsorb™ has a similar level of performance as activated carbon. As a non-carbon based absorbent, Minsorb™ does not impact free carbon content in the waste.

How can I use Minsorb™ ?

Minsorb™ can be injected directly in duct, or in the frame of a dry or semi dry process.

Is it easy to use Sorbacal® SP ?

Yes, Sorbacal® SP is ready to use and doesn't need any additional equipment like a pin mill or a crusher. This results in significant savings in investment and operating costs including electricity and maintenance.

Can I use Sorbacal® SP to remove HF and SO_3 ?

Yes, Sorbacal® SP is perfectly efficient in removing HF and SO_3, for example in power plants and in the glass industry. Due to the very strong affinity of Sorbacal® SP to these acids, just a very small quantity is sufficient to prevent the corrosion risks and to extend the life to the plants.

Is Sorbacal® SP compatible with existing processes ?

Yes. If you already have a classical dry or a semi-wet, even a wet process, a single addition of Sorbacal® SP can boost the performance of emission limits without expensive investment in retrofitting your plant.

Is Sorbacal® SP compatible with a dry absorption using a sodium-based reagent ?

Yes, Sorbacal® SP can be adapted to your existing process even if you use a sodium-based reagent. On a weight for weight comparison, less Sorbacal® SP will be used than sodium based reagents and so you will have benefit from lower running costs.

What kind of service may I expect from Lhoist ?

Sorbacal® is associated with a wide range of services developed to deliver a personalised solution:

- A full consultancy approach on the customer's process
- Residue analysis
- Full scale test equipment if required
- Trial follow-up
- Recommendations for the design of high performance equipment
- Optimisation performance of Sorbacal® SP.

What about the CO_2 emission while using Sorbacal® SP ?

The use of Sorbacal® SP has no impact on your CO_2-emission. Sorbacal® SP is ready-to-use and does not need additional electricity on site and does not release any CO_2 prior to reacting with acid gases.

Is Sorbacal® SP a proven solution ?

Sorbacal® SP has received hundreds of testimonials worldwide, in very stringent countries like Japan and in Europe and is produced in nine plants worldwide.

BELGIUM
Lhoist Western Europe
www.lhoist.be

CZECH REPUBLIC
Lhoist s.r.o
www.lhoist.cz

DENMARK
Faxe Kalk
www.faxekalk.dk

FINLAND
Lhoist Nordic
www.lhoist-finland.com

FRANCE
Lhoist France
www.lhoist.fr

Balthazard & Cotte
www.balthazard.com

GERMANY
Rheinkalk
www.rheinkalk.de

THE NETHERLANDS
Lhoist Nederland
www.lhoist.nl

POLAND
Lhoist Polska
www.lhoist.pl

PORTUGAL
Lusical
www.lusical.pt

SPAIN
Govsur
www.lhoist.com

SWEDEN
Lhoist Nordic
www.lhoist.se

UNITED KINGDOM
Lhoist UK
www.lhoist.co.uk

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(*) Lhoist Western Europe, Lhoist s.r.o, Faxe Kalk, Lhoist Nordic, Lhoist France, Balthazard & Cotte, Rheinkalk, Lhoist Nederland, Lhoist Polska, Lusical, Govsur, Lhoist Nordic, Lhoist UK are companies of the Lhoist Group.

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