exegy

by Soletanche Bachy

Low Carbon concrete solutions
for foundations

SOLETANCHE BACHY

Our experience in Low Carbon

With **EXEGY by Soletanche Bachy**, we provide you with our expertise in foundations and soil technologies, and our long experience in Low Carbon concretes. The objective is to help you reduce your project's environmental footprint.

Soletanche Bachy has been using Low Carbon concrete in foundations for more than 30 years

Initially chosen for their superior technical performance:

+ Durability	+ Lower binder hydration heat	+ Lower use of admixtures
+ Increased resistance to aggressive environments	+ Lower risk of thermal cracking	+ Positive impact on maintaining workability

Between 2012 and 2020, Soletanche Bachy completed in France:

50% of its projects using Low Carbon concretes	**25%** of its projects using Very Low Carbon concretes

These technical qualities continue to apply and combine with environmental benefits responding to today's challenges

+ **The regulations governing the construction of buildings are being tightened** regarding greenhouse gas (GHG) emissions.

+ **This is why we are supporting our customers** to help them anticipate and comply with the new regulations.

Misconceptions about Low Carbon solutions

They are necessarily more expensive than conventional solutions.

The use of Low Carbon concretes and grouts generally has a cost equivalent to conventional materials used for foundation applications. It is even possible to save money by self-supplying: low carbon solutions have lower requirements in terms of short-term strength than civil engineering concrete and use less binder. Availability and distance between the source and the place of use are vital factors to take into account.

They do not offer the same guarantees as conventional solutions.

Low Carbon concretes and grouts are classified by level of compressive strength. **For each strength class, they offer the same guarantees as conventional materials**. So whatever strength is required for your project, we have the right EXEGY by Soletanche Bachy concrete or grout!

They are complex to implement.

Once the sources of substitute binders have been identified, **implementation of Low Carbon concretes and grouts is no different from conventional concretes and grouts**. It does not require any special equipment or skills on the worksite.

They are not covered by regulations

The EXEGY by Soletanche Bachy range contains a number of Low Carbon covered by regulations, engineering and performance-approach concretes are produced in a framework controlled by the Soletanche Bachy materials laboratory, under the control of the customer.

EXEGY by Soletanche Bachy

Our answer: **EXEGY by Soletanche Bachy**, a solution for supplying Low/Very Low/ Ultra Low Carbon concretes and grouts for foundations

EXEGY by Soletanche Bachy includes bespoke materials and services, to provide you with the most suitable Low Carbon concretes and grouts for the foundations of your project.

The EXEGY offer

Low carbon materials adapted to all strength classes

Depending on the strength class, specifications and CO_2 reduction objectives of each project, we can:

Use cement and substitute binders available on the market (if available in your region)

We source and supply low carbon concretes and grouts available on the market

Or

To achieve the level of CO_2 reduction required for your project or if no market solutions or binders are available in your region, we can also:

Create bespoke formulations by recombining the components in a controlled process

We design bespoke materials with a reduced carbon footprint:
→ **EXEGY concretes** → **EXEGY grouts**

Exclusive services to benefit from Soletanche Bachy's materials expertise

Materials laboratory

We carry out the design, testing and implementation of tailor-made Low Carbon concrete/grout mixes for your project

Search for alternative binders locally

We check the availability of alternative binders in the region of your project and ensure supply

Supplier relations

We identify the best concrete manufacturers on the market to deliver high performance Low Carbon concretes and grouts

Low Carbon/Very Low Carbon/Ultra Low Carbon — What do they mean?

The **EXEGY by Soletanche Bachy** nomenclature establishes classes of CO_2 reduction compared with conventional concretes/grouts, according to the amount of clinker substitute binders in the cement:

Low Carbon

→ **Concrete**: between 30% and 60% substitute binders

→ **Grout**: between 60% and 80%

Very Low Carbon

→ **Concrete**: between 60% and 80% substitute binders

→ **Grout**: between 80% and 90%

Ultra Low Carbon

→ **Concrete**: between 80% and 95% substitute binders

→ **Grout**: > 90%

CONCRETES	Conventional		Low Carbon		Very Low Carbon		Ultra Low Carbone		
Type of cement	CEM I	CEM II/A	CEM II/A ou CEM V/A	CEM I + S	CEM I + S + V	CEM III/B	CEM III/C	CEM I or II + S	Alternative binder
Level of clinker	95-100%	80-94%	35-64%	50%	35%	20-34%	5-19%	10%	5%
Substitute	None	All possible	Fly Ash + slag	Slag + Filler	Slag, Fly Ash or filler	Slag	Slag	Slag	Activated slag
CO_2 emissions	315	269	175	178	133	116	83	79	75
CO_2 reduction (vs CEM I)	0%	-15%	-54%	-53%	-65%	-69%	-78%	-79%	-80%

GROUTS	Conventional			Low Carbon		Very Low Carbon		Ultra Low Carbone	
Type of cement	CEM I	CEM II/A	CEM III/A	CEM III/B	CEM I + S/L/V/P/Q	CEM III/C	CEM I + S/L/V/P/Q	Slagsol	Alternative binder
Level of clinker	95-100%	80-94%	35-64%	20-34%	20-30%	5-19%	10-15%	5-10%	0-5%
Substitute	None	All possible	Slag	Slag	Mineral admixtures	Slag	Mineral admixtures	Slag	Activated slag

S = slag – V = fly ash – P = pozzolan – Q = calcinated clays - L = limestone filler

The EXEGY offer

To obtain the CO_2 reduction required for your project, regardless of the strength class, **EXEGY by Soletanche Bachy** offers the following concrete and grouts:

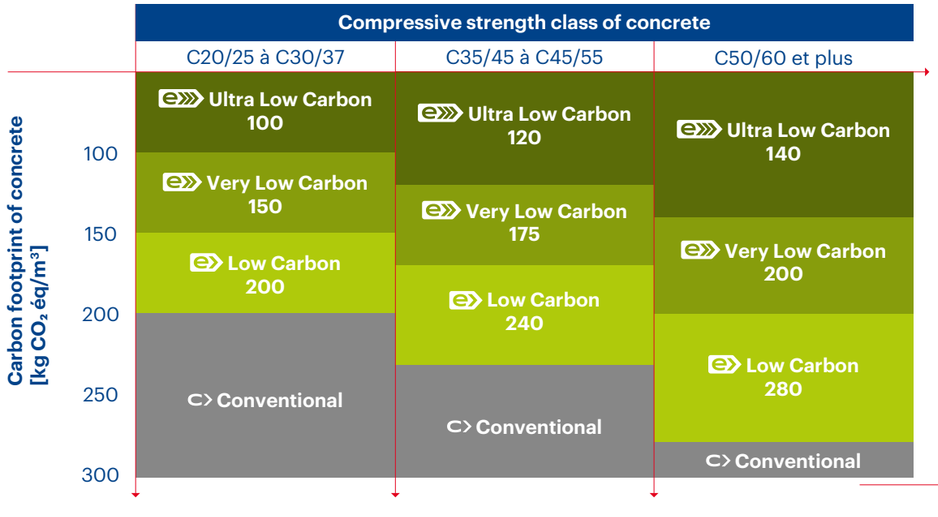
Low Carbon **Very Low Carbon** **Ultra Low Carbon**

EXEGY concretes

Examples of EXEGY Foundations by Soletanche Bachy concrete mixes:

Base C35/45 (380kg cement/m3 of concrete	Mix/Cement	% clinker	CO_2 reduction (vs CEM I)
Ultra Low Carbon	Alternative binder	5%	-76%
	CEM I or II + slag	10%	-75%
Very Low Carbon	CEM I + slag + fly ash	35%	-58%
Low Carbon	CEM I + Slag	50%	-47%

CO_2 emission limit values by strength class



EXEGY grouts

Examples of EXEGY grouts formulations' CO_2 emission factors:

Carbon footprint of grout (kg CO_2 eq/m³)	Cut-off walls			Reinforced grout walls/grouting		Rock injection	Sealing
Target compressive resistance (in MPa)	0,5	1	2	5	10	20	>25
CEM I	280	337	394	490	547	777	968
CEM II	279	328	427	476	541	672	836
CEM III/A	127	141	151	218	268	319	403
CEM III/B Low Carbon	111	121	129	182	222	301	367
CEM III/C Very Low Carbon	74	81	92	121	152	199	239
Slagsol 95/5 Ultra Low Carbon	60	64	73	93	106	131	153

CO_2 emission limit values by strength class (kg CO_2 eq/m³)

Strength range (Mpa)	0 - 0.5	0.5 - 1	1 - 2	2 - 5	5 - 10	10 - 20	>25
Low Carbon	120	130	140	185	250	300	400
Very Low Carbon	100	110	120	150	180	220	300
Ultra Low Carbon	70	80	90	120	140	180	200

Calculation basis: Fixed rate of 50kg eq/m³ (production) + CO_2 emissions depending on binder and dosage to achieve Rc within the class

Our EXEGY expertise

With **EXEGY** by **Soletanche Bachy**, you benefit from our materials department's expertise in the assessment, mix design, technical validation and on-site implementation of Low Carbon concretes and grouts most suitable for your project.

5 materials engineers 3 materials technicians	**A materials laboratory dedicated to testing mix designs, characterisation while fresh and mechanical resistance (based in Montereau, France)**
Over 60 years of experience	**References from all around the world and all types of infrastructure projects: bridges, subways, dams and port structures**
Relationships and partnerships with all ready-mixed concrete players	**A research network with university laboratories**

Notre environmental commitment

The Soletanche Bachy group's environmental action plan

- Reduce our carbon footprint by 40% by 2030 (scopes 1-2)
- Reduce our cement consumption (scope 3)
- Minimise our waste and maximise its recycling/ recovery

Soletanche Bachy Canada's environmental commitments

SOLETANCHE BACHY CANADA

- Reduce our direct and indirect impact to the environment from our construction activities
- Reduce waste on jobsites and in our offices, through efficient design and execution, and maximizing opportunities to recycle
- Reduce overall energy consumption in our offices and across our operations

Find out more about Low Carbon concrete

Where do concrete's CO_2 emissions come from?

Cement is responsible for **85% of concrete's CO_2** emissions although it only accounts for **12% of its composition**

What can be used to replace clinker?

- Industrial coproducts: blast furnace slag, fly ash
- Natural materials: pozzolan, calcined clays, limestone filler

Why does cement release so much CO_2?

Clinker, its main constituent (produced by firing limestone and clay), is responsible for cement's carbon footprint due to:

- Heating cement plant furnaces to 1,500°C (1/3)
- The chemical reaction that releases carbon during firing (2/3)

Cements with less clinker exist, which are used in the composition of concretes, including for foundations:

CEM I, CEM II/B CEM III/A, CEM III/B or CEM III/C, CEM V	CEM I + S or V ou L	CEM I + S and/or V and/or L; CEM II + S or V or L/Activated slag

SOLETANCHE BACHY

www.soletanche-bachy.com