Special Binders

PROMPT
TECHNICAL DOCUMENT

Sales & Distribution - Tŷ-Mawr Lime Ltd, Unit 12, Brecon Enterprise Park, Brecon, Powys. LD3 8BT. - **Tel** : 01874 611 350
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CONTENTS

A NATURAL hydraulic binder

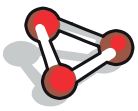
A NATURAL hydraulic binder is a binder manufactured from a single natural raw material, without additives.

PROMPT is a NATURAL HYDRAULIC BINDER which results from firing an argillaceous limestone of regular composition extracted from homogeneous rock strata, between 800 and 1200 □C, followed by very fine grinding.

It is a **fast-setting and fast-hardening binder**

European Technical Agreement
is expected in 2003


Physical characteristics


Chemical characteristics

Properties

Natural deposit

For more than 150 years, in the Chartreuse mountains, a unique natural deposit has been exploited to manufacture Prompt.

This limestone deposit, in the French Alps to the north of Grenoble,
consists of folds of sedimentary strata formed during the formation of the Alps.

A single geological layer makes up this unique natural deposit. It consists of an argillaceous limestone whose chemical and mineralogical compositions are consistent, precise and ideal for manufacturing cement without external additives :

Prompt is a NATURAL binder

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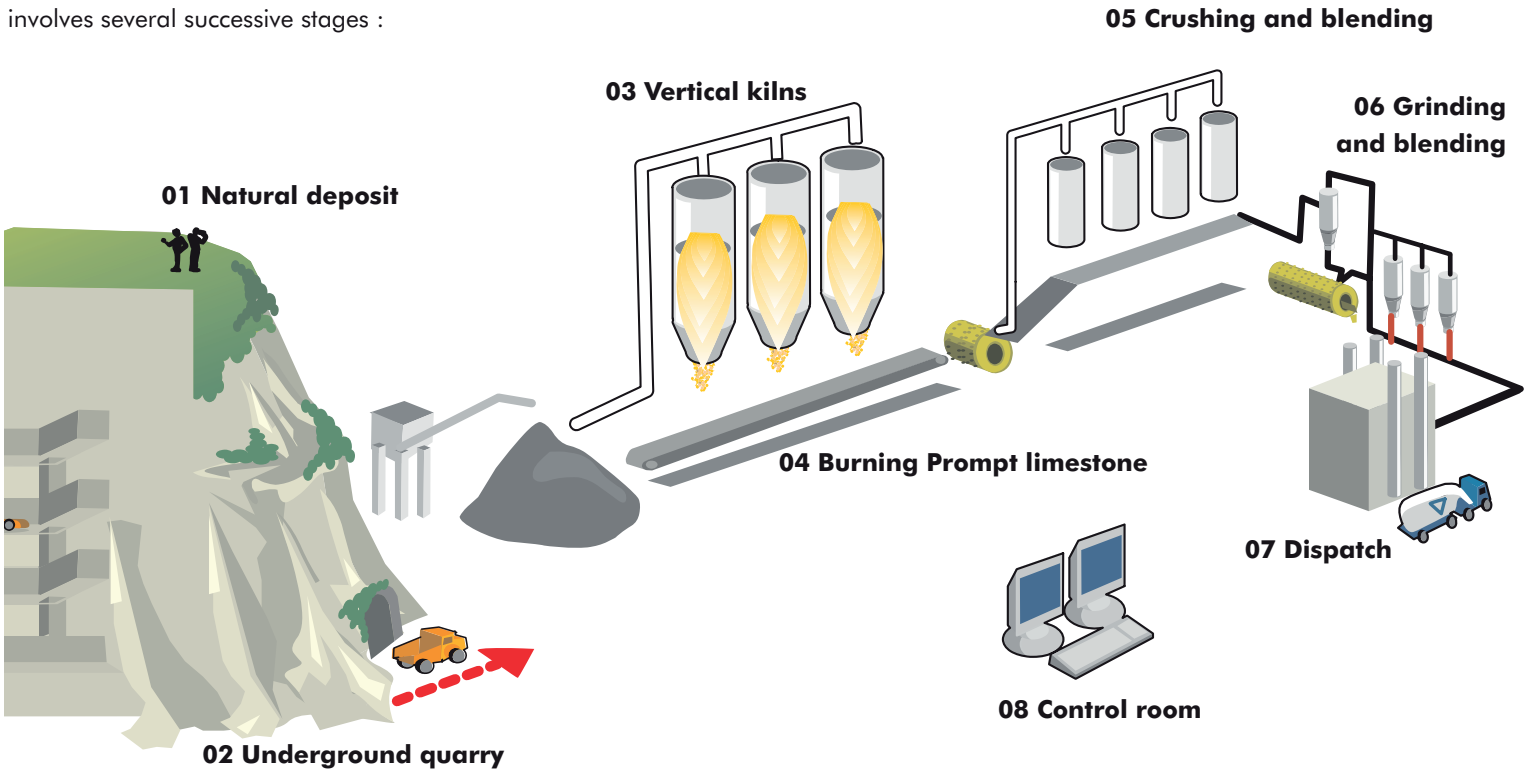
Manufacture of PROMPT

From mining to delivery, the manufacture of PROMPT involves several successive stages :



Physical characteristics of PROMPT (NF P 15-314)

The tables below show the average values of the physical characteristics of PROMPT obtained after completion of factory quality control inspections.

Physical characteristics

Characteristics	Standards	Averages	Specifications
Specific Gravity		2,97 g/cm^3	
Apparent density		0,7 à 1,0 g/cm^3	
Blaine Surface area	EN 196-6	7000 cm^2/g	> 5000
Initial set (pure paste)	EN 196-3	1,5 mn	< 4
Expansion at 80 ÎC	EN 196-3	5 mm	< 15
Shrinkage (mortar 1-1 by weight)at 28 days	NF P 15-433	700 □m/m	< 1200
Heat of Hydration at 1 hour	NF P 15-436	120 J/g	70 ⩽ H ⩽ 150

Compressive strength (MPa)

Age	Test Method	Average Value	Requirement
15 minutes	EN 196-1	5	>4
1 hour	EN 196-1	7	>6
3 hours	EN 196-1	9	>8
1 day	EN 196-1	13,5	>10
7 days	EN 196-1	22	>14
28 days	EN 196-1	31	>19
90 days	EN 196-1	40	

mortar 1-1 by weight

1 MPa = 1 N/mm^2 = 10,2 kgf/cm^2 = 10 bars

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Chemical characteristics of Prompt (NF P 15-314)

The table below shows the average values of the chemical characteristics of PROMPT obtained after completion of factory quality control inspections

Chemical characteristics	Test Method	Average Value (%)	Standard Requirement (%)
Silica (expressed as SiO_2)	EN 196-2	18,4	≥ 17
SO_3 content	EN 196-2	3,2	≤ 4
Loss on Ignition	EN 196-2	9,4	≤14
Insoluble content	EN 196-2	3,2	≤ 6
$Al2O_3/Fe2O_3$ ratio	EN 196-2	2,3	≥ 2

Properties

The mineralogical composition of **PROMPT** gives it some particular properties :

Main Properties

Speed

- ⊕ Very fast setting and hardening
- ⊕ To delay setting time

Strength

- ⊕ Compressive strength after 28 and 90 days
- ⊕ Adhesion to all substrates

Durability

- ⊕ Strength gain over the long term
- ⊕ Resistance to corrosive water (above/equal pH 4)
- ⊕ Resistance to sea water

Complementary property

- ⊕ Waterproofing

Very fast setting and hardening

PROMPT mortar sets very quickly :

At 20 °C : Initial set : **2 minutes**
Final set : **1 minute later**

Continued hydration leads to hardening.

Hardening is almost instantaneous :

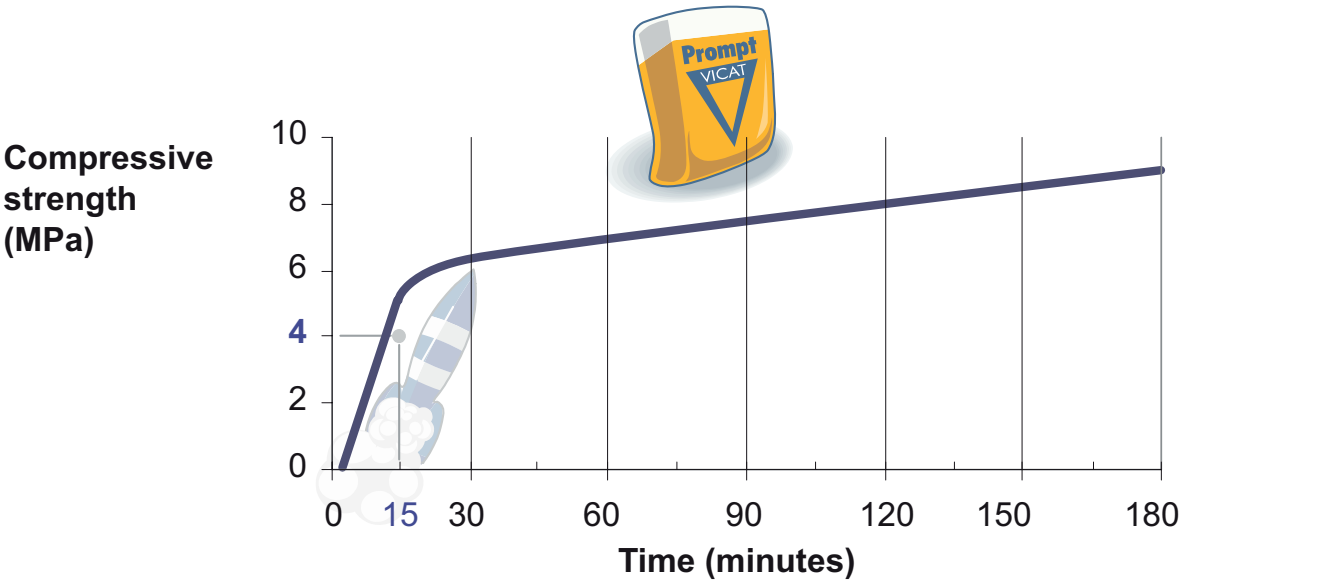
PROMPT mortar 1:1 by weight (2 vols PROMPT - 1 vol sand) :

The minimum compressive strength is :

4 MPa after 15 minutes at 20 °C

This fast gain in compressive strength of PROMPT mortar is exceptional :

PROMPT: a true force of nature !



PROMPT mortar 1-1 by weight (2 volumes PROMPT - 1 volume sand) W/C = 0.4

NB : When PROMPT mortar 1:1 by volume is used, the above strengths are reduced by 30% ; 4 MPa is obtained after 30 minutes

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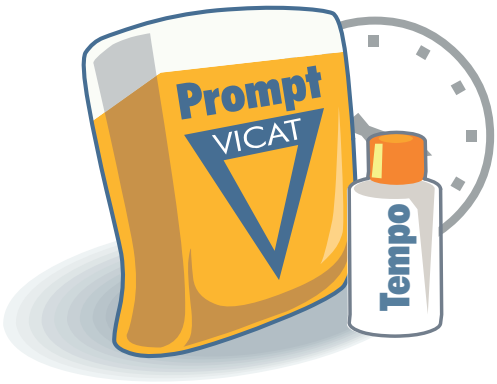
To delay setting time



Setting of PROMPT mortar can be delayed by the addition of a retarding agent *(Caution! Many retarding agents used for common cements do not work with PROMPT)*

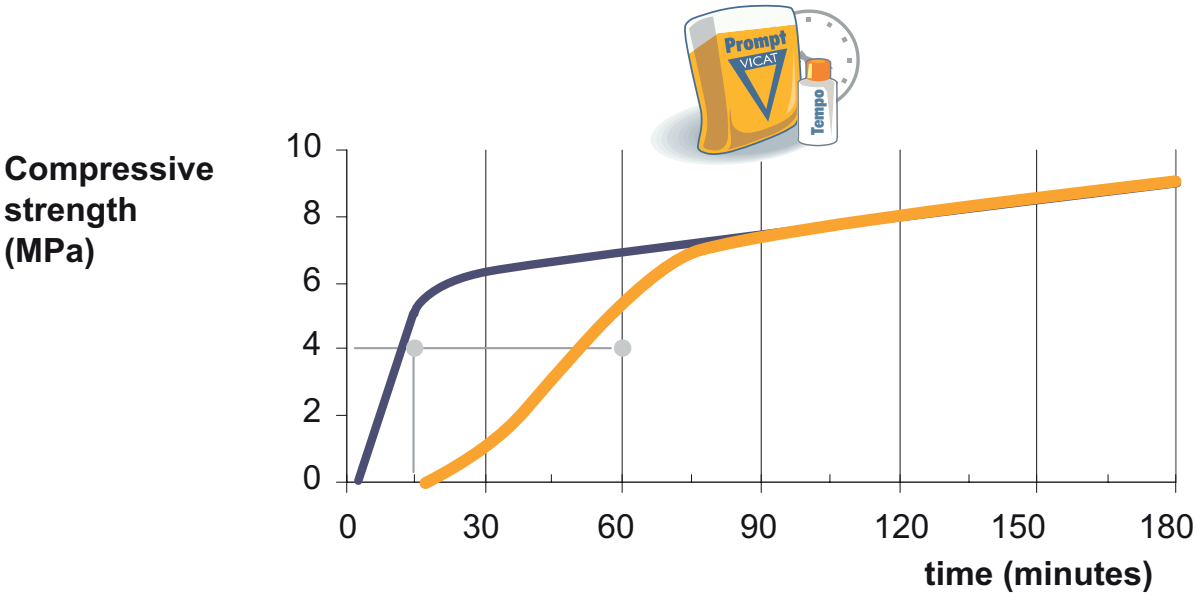
The most effective retarding agent is citric acid (E330) sold in 80 grams bottles under the trade name **TEMPO**

PROMPT mortar 1-1 by weight (2 vols PROMPT - 1 vol sand) with addition of TEMPO :

"TEMPO dosage" = one capful (7 g)/ litre of PROMPT

Setting and hardening are fast

At 20 □C : Start of setting : > **15 minutes**
Hardening : **4 MPa is obtained after 1 hour**



very fast setting/almost instantaneous hardening at 20 ºC
fast setting and hardening with the addition of **TEMPO**

PROMPT mortar 1-1 by weight (2 volumes PROMPT - 1 volume sand) W/C = 0.4

NB: When PROMPT mortar 1:1 by volume is used, the above strengths are reduced by 30% ; with TEMPO, 4 MPa is obtained after 90 minutes

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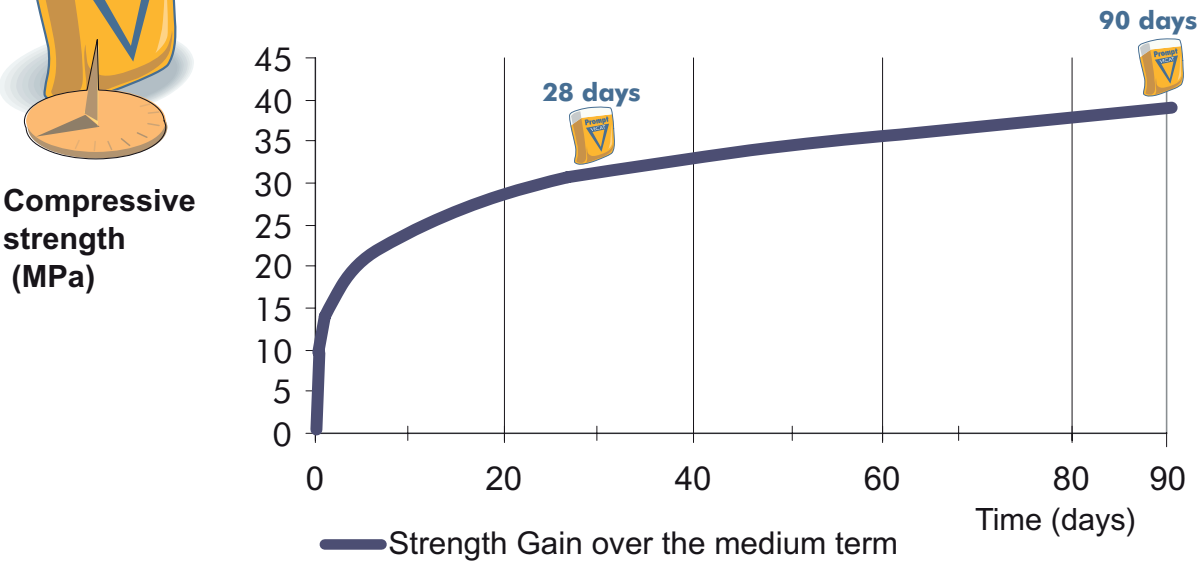
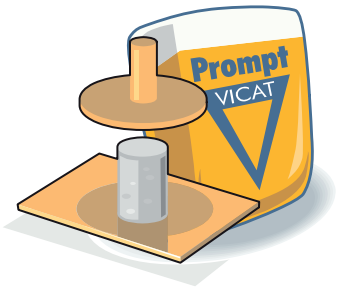
Compressive strength after 28 and 90 days

After the very quick strength gain in the first few minutes and hours, Prompt continues to gain strength at a steady rate up to and beyond 28 days.



PROMPT mortar 1-1 by weight (2 volumes PROMPT - 1 volume sand) W/C = 0.4

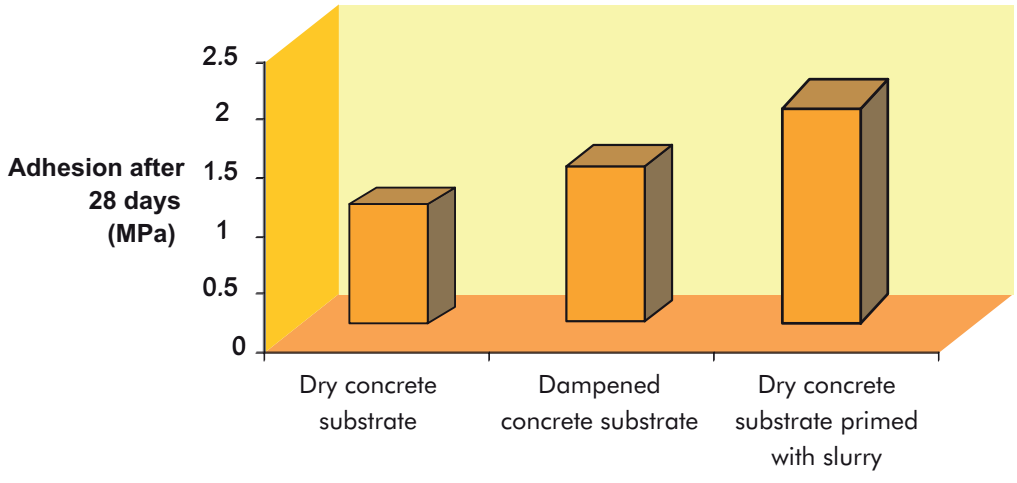
NB : When PROMPT mortar 1:1 by volume is used the above strengths are reduced by 5 MPa



Adhesion to all substrates

Due to its high fines content, Prompt develops excellent adhesion to all types of building material ; adhesion to a damp surface is significantly better than that obtained on a dry surface ; it is improved even more if a **slurry*** is applied beforehand.

Adhesion of Prompt mortar



* A layer of mortar on the substrate of almost zero thickness used to prime the substrate before laying a full thickness of mortar.

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Strength gain over the long term

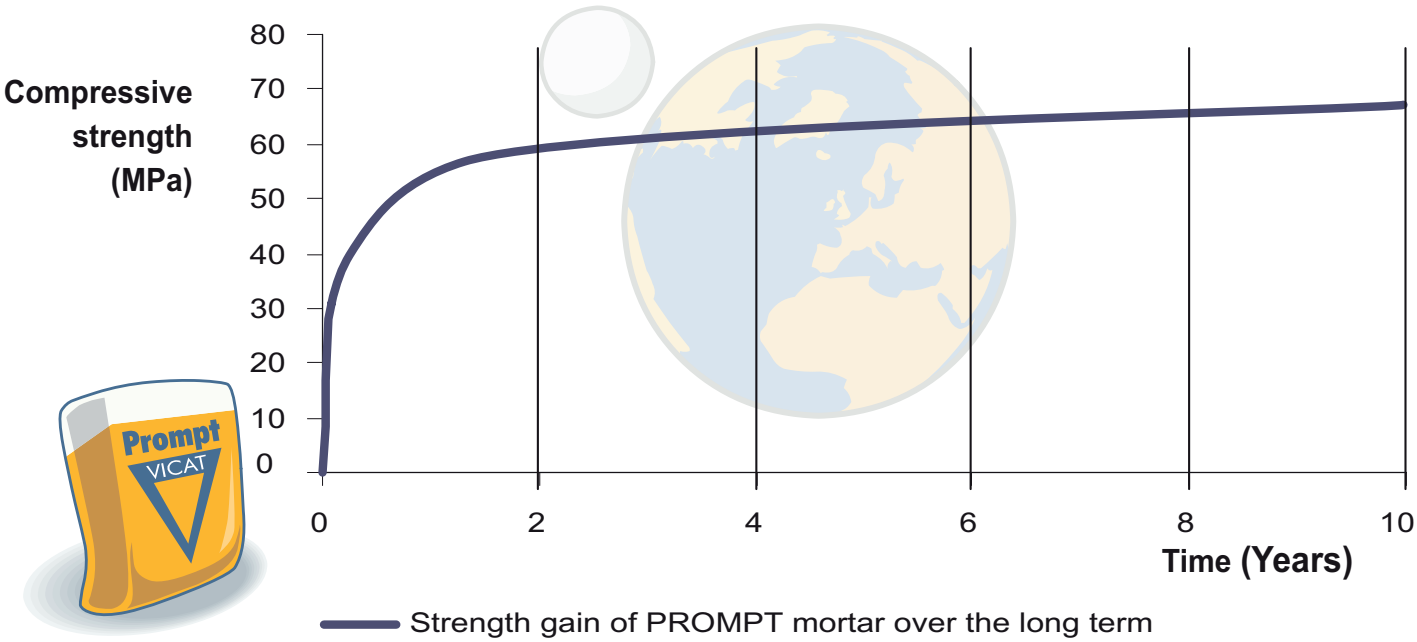
As far as the development of compressive strengths over time is concerned, the 2 main characteristics of PROMPT are :

Very quick onset in the first few minutes

Continued increase over a very long period (several years)

This continued increase in strength improves the compactness of the mortar as the years progress ; this is an important factor in the DURABILITY of PROMPT-based mortars and concretes.

Hydration of the highly reactive PROMPT aluminates enables development of strength in the very first quarter of an hour ; slow hydration of the C_2S generates a strength gain over several years ; this phenomenon, which provides the possibility of autogenous healing over a long period, is another important factor in **DURABILITY**.



Strength gain of PROMPT mortar over the long term

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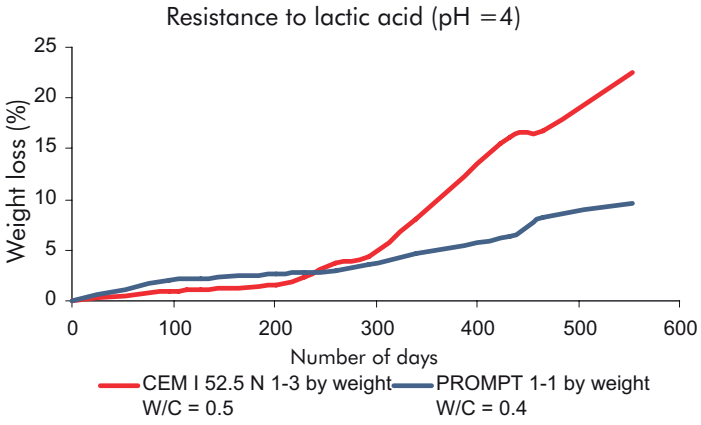
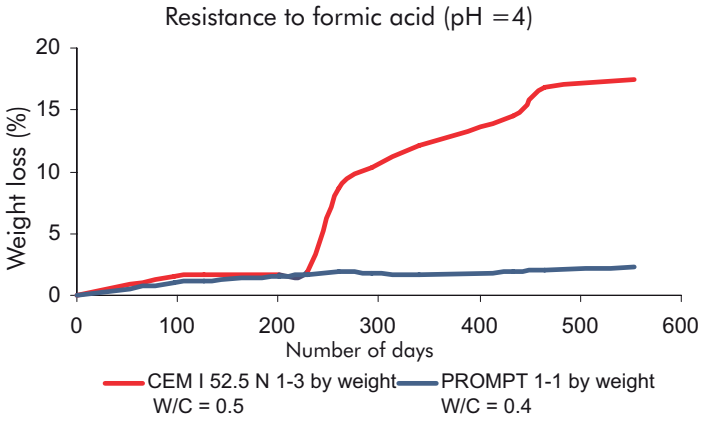
Resistance to corrosive water

Resistance to pure and acidic water

The mineralogical composition of PROMPT means that there is a minimal release of lime during hydration, unlike common cements ; the resistance to pure and acidic water of a Prompt mortar is therefore excellent up to pH =4





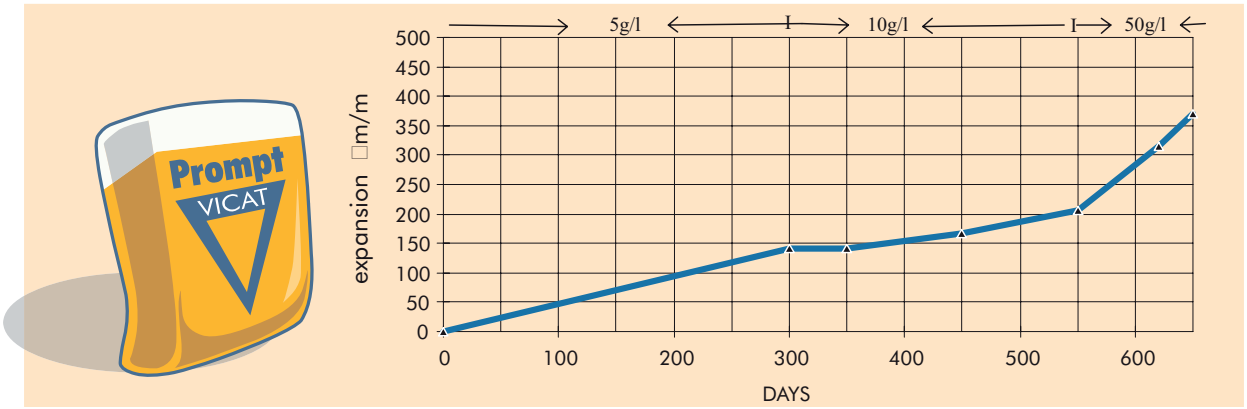
Resistance to sulphated water

PROMPT mortar behaves very well in the presence of sulphated water.

Test pieces 4 x 4 x 16 cm were prepared ; mortar 1-2 by weight, W/C = 0.40

They were kept totally immersed in a solution of magnesium sulphate with a concentration fixed at :

5 g/l for 300 days **10 g/l for 250 days** **50 g/l for 100 days**



This slow increase in expansion is explained by the gradual reduction in permeability of the Prompt mortar, as well as the limited release of lime during hydration; these results demonstrate the excellent resistance of PROMPT mortar to concentrated sulphated water.

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Caring for the future,
respecting the past...

Manufacturer and supplier of traditional and environmentally-friendly building materials.

Port of La Rochelle

Resistance to sea water

PROMPT meets French Standards
for sea-water setting cements.

Having demonstrated excellent behaviour during long-term tests, PROMPT has been deemed suitable for work at sea.

It therefore has good resistance to attack from sea air.

These durability tests were performed on cubes of PROMPT mortar submerged

for 50 years

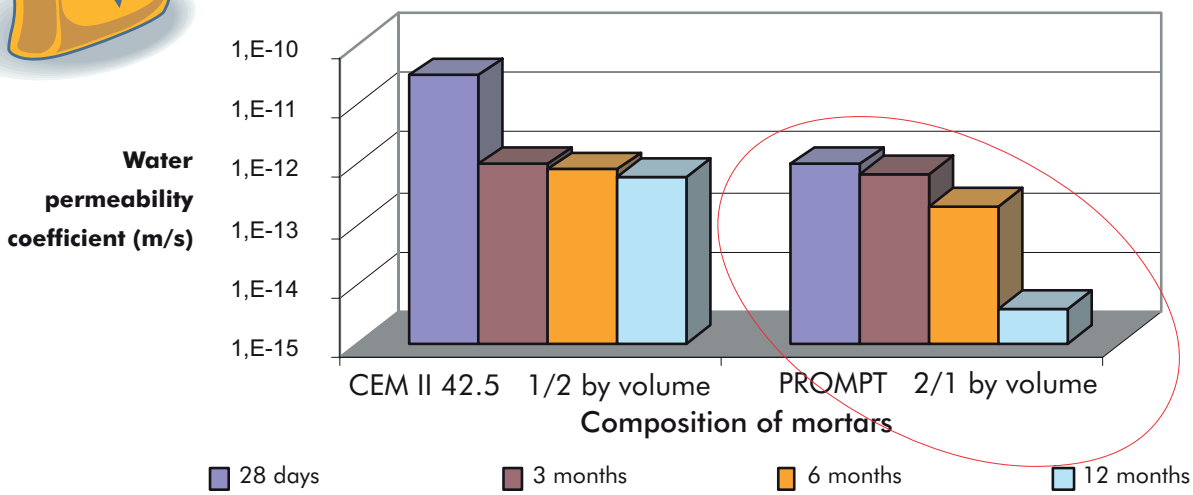
in the port of **La Rochelle** (France)

They demonstrated that the cubes were still in a completely satisfactory state of preservation.

Waterproofing

The permeability of common cement mortars remains constant after 3 months.

In contrast, that of PROMPT mortar continues to decrease over time :
In parallel with the strength gain, porosity is reduced,
and **waterproofing enhanced**.



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A multifunctional binder for construction

Projects

with PROMPT mortar

PROMPT is used to make fast-setting traditional mortars and renders

FAST TRADITIONAL MASONRY WORK

- Fast masonry work
- Fixing - Bedding-in
- Repair work
- Waterproof rendering

DECORATION

- Decoration and restoration of façades
- Works with lime mixes

PROMPT mortar Application

Using TEMPO

Mix proportions

Preparing PROMPT mortar

Recommendations for use

Some Rules

PROMPT is packed in 25 kg bags

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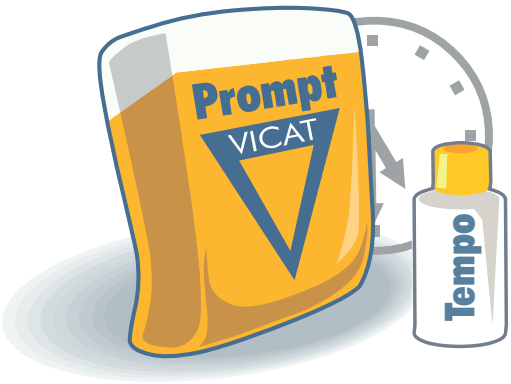
EASE of APPLICATION



TEMPO (citric acid) is the admixture for PROMPT.
It is added in proportion to the VOLUME OF PROMPT USED :

"TEMPO dosage" : 1 capful per litre of PROMPT

1 capful = 7 grammes
1 litre of PROMPT = approximately 2 trowelfuls

The addition of TEMPO delays setting in PROMPT mortar by 10 to 30 minutes depending on the temperature :
(above this dosage, Tempo has little effect)

Mortar temperature	10°C	20°C	30°C
Setting time without Tempo	4 minutes	2 minutes	1 minute
Setting time with "TEMPO dosage"	30 minutes	15 minutes	10 minutes

Below 10 °C, half the TEMPO dosage can be used to keep the setting time less than 30 minutes

PROMPT + "TEMPO dosage" : Work AT YOUR OWN PACE

- TEMPO gives you the time to :
  do a good job
  clean your tools properly
- It allows you to mix a larger quantity of mortar at one time
- The compressive strength of PROMPT mortar is maintained with TEMPO

PROMPT + "TEMPO dosage" : Work QUICKLY and WELL

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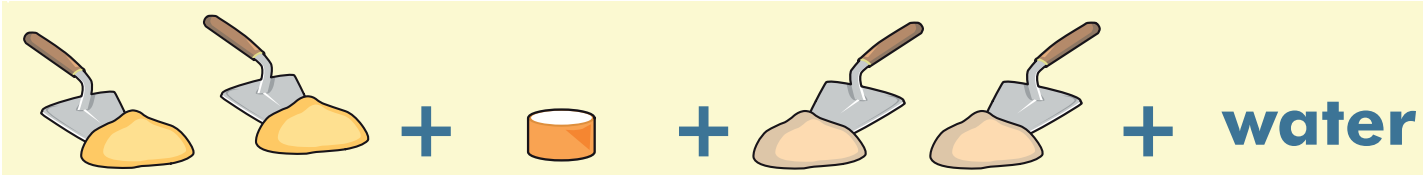
Mix proportions

USUAL APPLICATION of PROMPT mortar (setting time = 15 minutes at 20 °C) :

Usual mix : 1 volume PROMPT/1 volume sand

(multiply these quantities according to the size of the project to be undertaken and the job time)



1 litre of PROMPT | 1 capful of TEMPO | 1 litre of sand | 0,3 to 0,5 litre

Add the water gradually so as to obtain the desired consistency

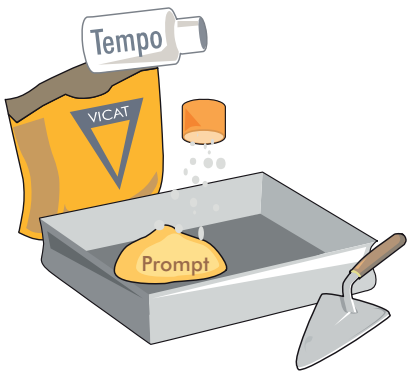
For the following applications :
- high resistance fixings
- working in damp, harsh conditions or exposed to sea water
- waterproofing

Double the proportions of PROMPT and TEMPO

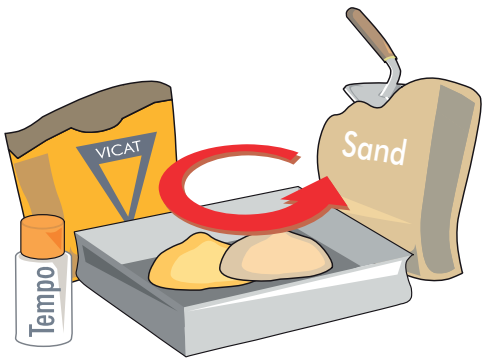
Preparing PROMPT mortar

(setting time = 15 minutes at 20 °C)

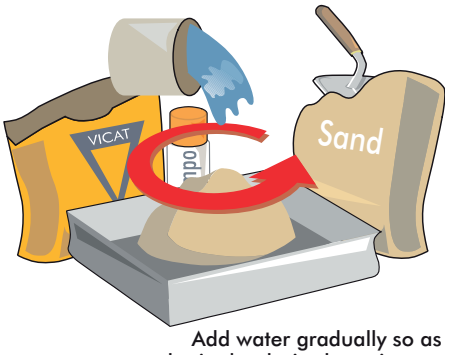
1 Sprinkle **Tempo** on PROMPT



2 Add **sand** and mix



3 Add **water** and mix



Add water gradually so as to obtain the desired consistency

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Recommendations for use

Prepare site before preparing PROMPT mortar

Use clean sand

Do not mix PROMPT and sand in advance : the moisture in the sand hydrates PROMPT and triggers the start of setting

Avoid excessive water, a main cause of shrinkage and cracking. Mortar with very wet sand will need less water

Only prepare as much as can be used before the mortar starts to set

Some Rules

Work on a **CLEAN DAMP** substrate (for adhesion)

The mortar must be laid completely **BEFORE setting starts** ; to have sufficient time to work at your convenience, **use the TEMPO admixture**

TEMPERATURE influences the initial setting time : warm weather reduces it, cold weather increases it ; the addition of TEMPO means that in warm weather you still have sufficient time to complete the job

AFTER setting starts :
Do not add water, stir or smooth over:
Setting only occurs once (risk of breaking the set)

CLOSE the bag carefully after use, and store it upside down in a dry place

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