



# LEADING PLASTER TECHNOLOGIES

*For TABLEWARE*  
— ASIA



## BOOST YOUR PERFORMANCE

### It is more than plaster...

At Saint-Gobain Formula, we are offering advanced casting solutions for ceramics, as sanitaryware, tableware, rooftile, handformer.

- ▶ We use premium natural gypsum to manufacture alpha and beta plasters. Advanced calcination and grinding technologies enable us to achieve high performance and consistent products.
- ▶ Our tailor-made solutions are based on our expertise in the ceramic manufacturing process and our "Art of Formulating".

### We are more than a plaster supplier...

At Saint-Gobain Formula, we are your trusted partner with vast industry experience.

- ▶ We offer a full process assessment; from mould-making to casting shop and problem solving for improving your production yield.
- ▶ We can provide training in your plant to improve the plaster-knowledge of your teams.
- ▶ We guarantee total confidentiality: we understand that it is your "know-how" that makes the difference.



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# ABOUT US

# formulate together brighter futures



**OUR VISION** Be the worldwide leader in the specialist gypsum and plaster industry.

**SUSTAINABILITY** Through our people and close collaboration with our customers, we provide high quality, customised and sustainable solutions.

### OUR VALUES



Respect



Ambition





Passion

## OUR MANUFACTURING PLANTS

A global supply chain



## OUR MARKETS

-  CERAMICS
-  CONSTRUCTION MATERIALS
-  FIBROUS & DECORATIVE PLASTER
-  FOOD, AGRICULTURE & ENVIRONMENT
-  DENTAL & PERSONAL CARE
-  CEMENT



In all ceramic applications (sanitaryware, tableware, roof tiles and hand former), mould properties and performance are key to achieve high quality finished items. Saint-Gobain Formula's ceramic plasters are highly valued for their technical properties, which include controlled porosity, mechanical strength to ensure mould durability, dimensional accuracy and perfect reproduction of fine details, design flexibility and ease of use compared to other techniques.

Saint-Gobain Formula offers a comprehensive range of tableware plaster formulations from its operations in plants for slip casting, jiggering, ram press processes and case moulds with dedicated products adapted to specific customer requirements.



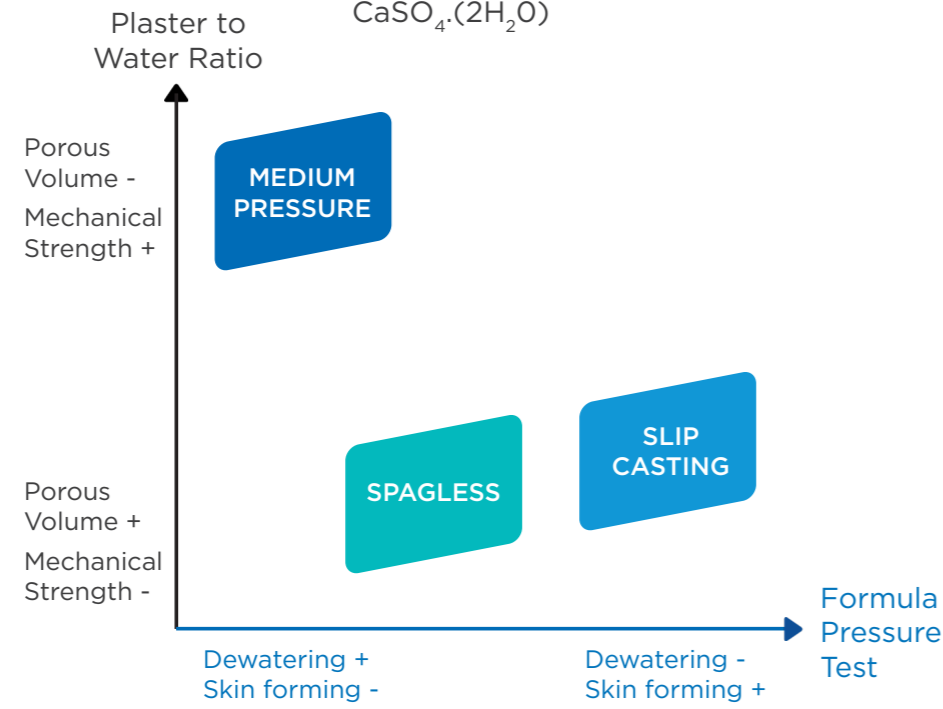
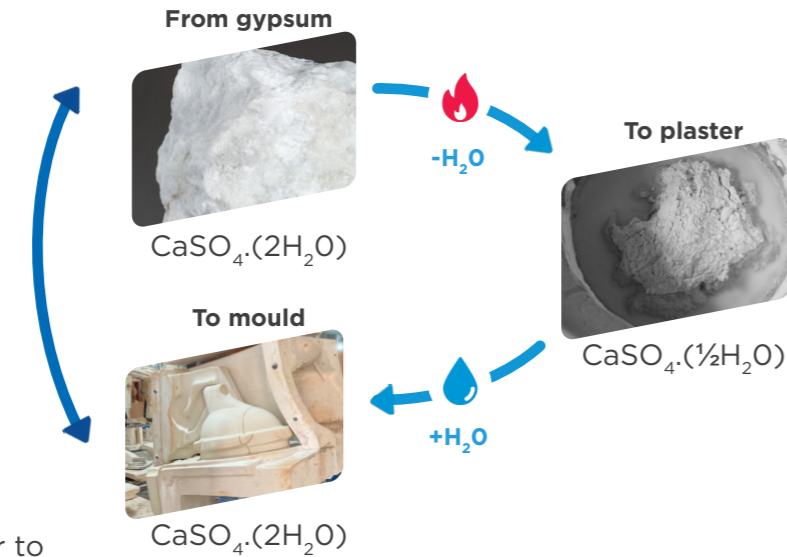
# PLASTER MOULD

## LEADING TECHNOLOGY

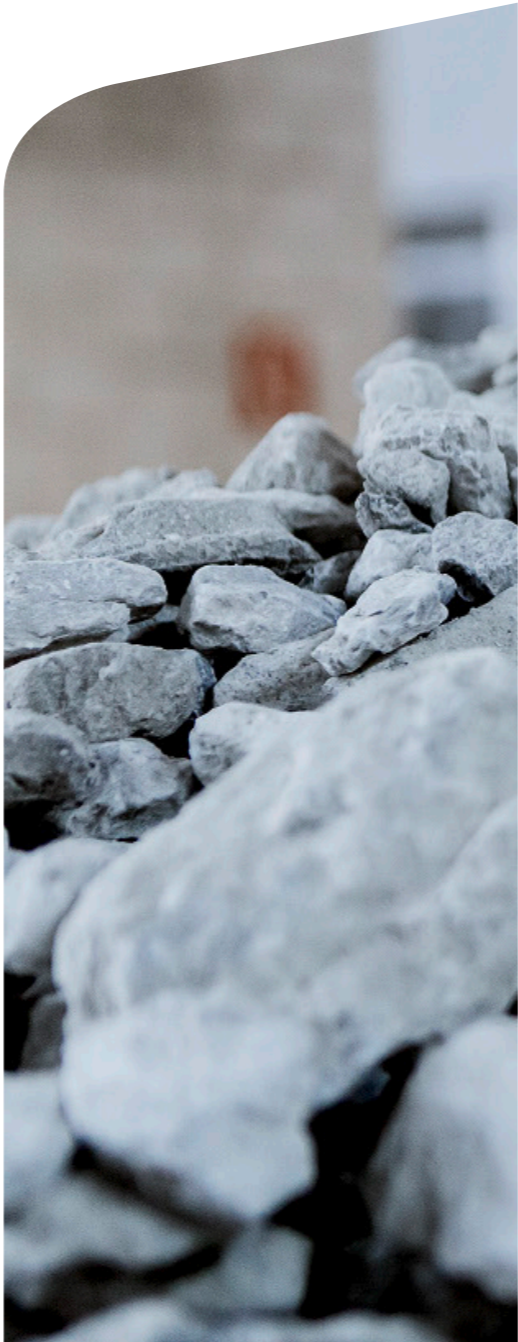
Plaster is the hemi-hydrated form of calcium Sulphate, and it is made by calcining gypsum.

When the dry plaster powder is mixed with water, it becomes gypsum again.

We can adjust the plaster to water ratio, setting time, absorption and permeability according to your mould making process and the properties required by your casting production and your ceramic slip.

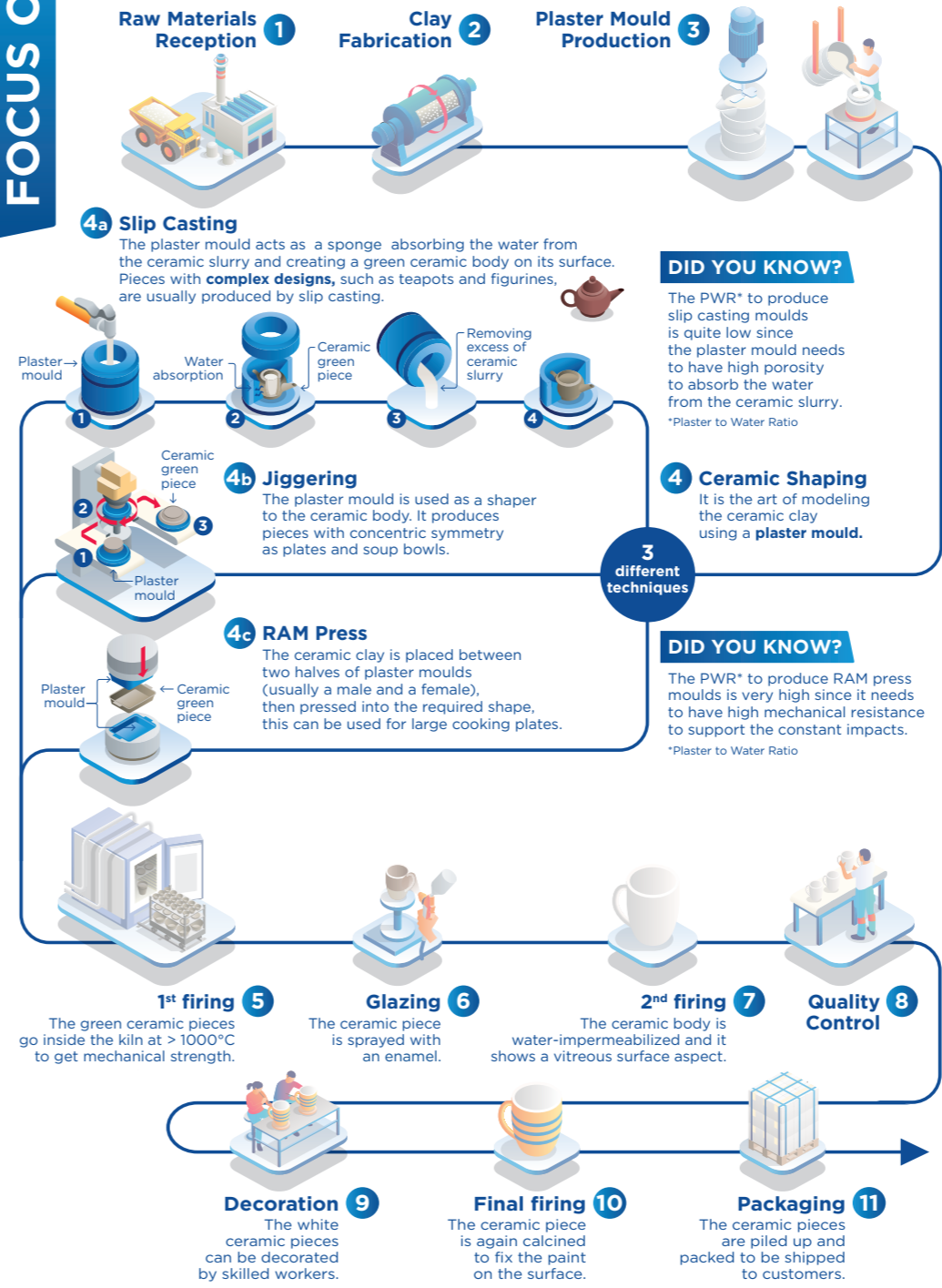


**Formula Pressure Test** is our innovative testing method to ensure the performance of our advanced plaster solutions.



### FOCUS ON

## TABLEWARE CERAMIC PRODUCTION



## MANUFACTURING PROCESS

The range of manufacturing techniques used to produce ceramic tableware is very wide. Almost all of the technologies use plaster: for designing and making the original model (modelling).

- ▶ for making the tooling by block mould and case mould (case).
- ▶ for making the working moulds from the case mould (generally for slip casting, jiggering, or ram press processes).

## CHOICE OF THE PLASTER

Best value for money for each manufacturing process.

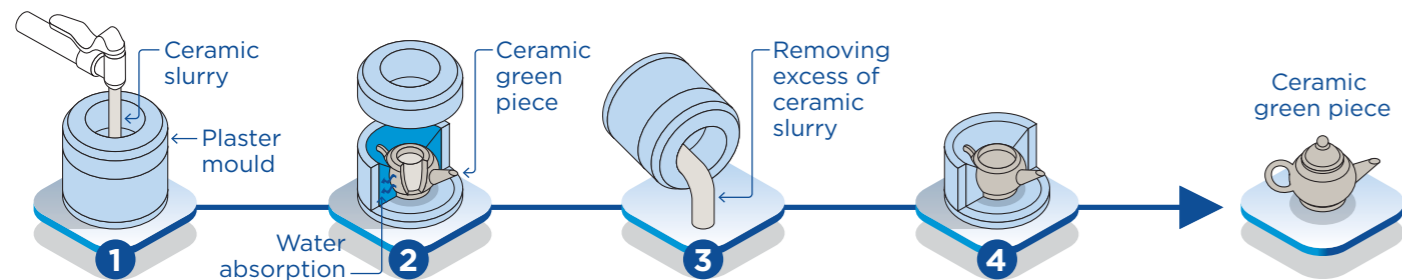
Applications	Slip Casting <i>Bone China Earthenware Stoneware</i>	Jiggering	Ram Press	Case
Mould properties	Porosity		Hardness	
Key parameters	Porosity controlled	Absorption	Permeability	Permeability
	Expansion controlled		Easy demoulding	Easy demoulding Dimensional accuracy
				Dimensional accuracy

### Advantage of using plaster:

- ▶ Ease of use: by mechanically mixing with water.
- ▶ Quality of the reproduction: shape, dimensions and fine details.
- ▶ Moulding behavior: sets quickly to the desired shape.
- ▶ High level of homogeneity.
- ▶ Easy reworking.

# SLIP CASTING

## ABSORPTION HIGH POROSITY



The casting technique, in which ceramic slurry comprised of a specific formulation of ceramic minerals suspension in water. Poured into plaster moulds, is the basic technique used for the production of ceramic items.

The porosity of the plaster mould absorbs the water in the slurry and thus causes a deposit of material to form on the inner wall of the mould, taking the shape of the mould. The thickness of this “skin” is proportional to the time for which it is allowed to form.

Product				Benefits
Molda SN 75C		1.51:1	10 - 15 min	- Fine particle size - Good balance between absorption and mechanical behaviour - Stable workability
Molda SN 75E		1.47:1	10 - 15 min	- Fine particle size - High absorption capability - Stable workability
Molda TW 75		1.33:1	6 - 19 min	- High absorption capability - Available in long or short setting time



# MULTI CASTING

Multicasting plaster range has been developed to improve absorption rate and mould life. Our Multicasting products allow you to improve productivity by increasing the number of casts in the same period of time.

Multicasting plaster characteristics include:

- ▶ Porosity is not affected by a variation of PWR (+/- 20%).
- ▶ Fluidity of MC plasters remains stable during pouring.
- ▶ Plaster can be poured as soon as it has been blended.
- ▶ Casting time is longer, even though the plaster starts to set earlier.

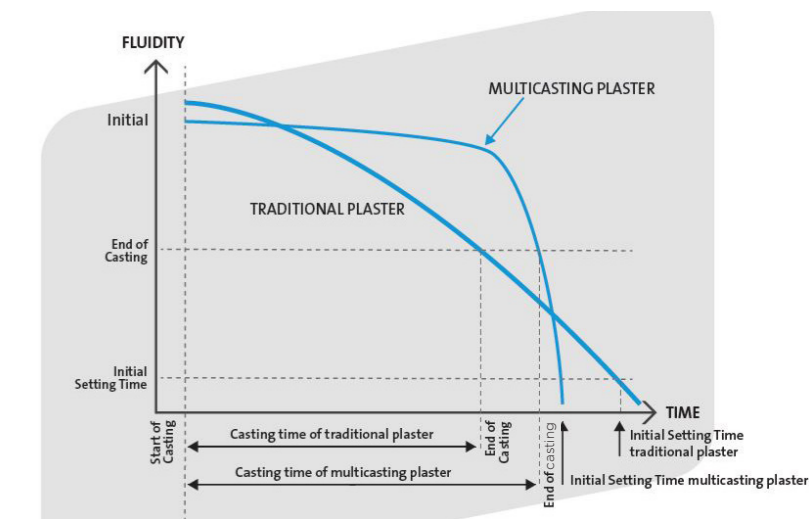
Mechanical strength of the moulds is significantly improved, thus enabling quicker release and improved mould behaviour.

**Saint-Gobain Formula MC Innovative technology, is the most adapted solution to optimize performance and effectiveness of your slip casting process.**

# INNOVATIVE TECHNOLOGY

## KEY FIGURES

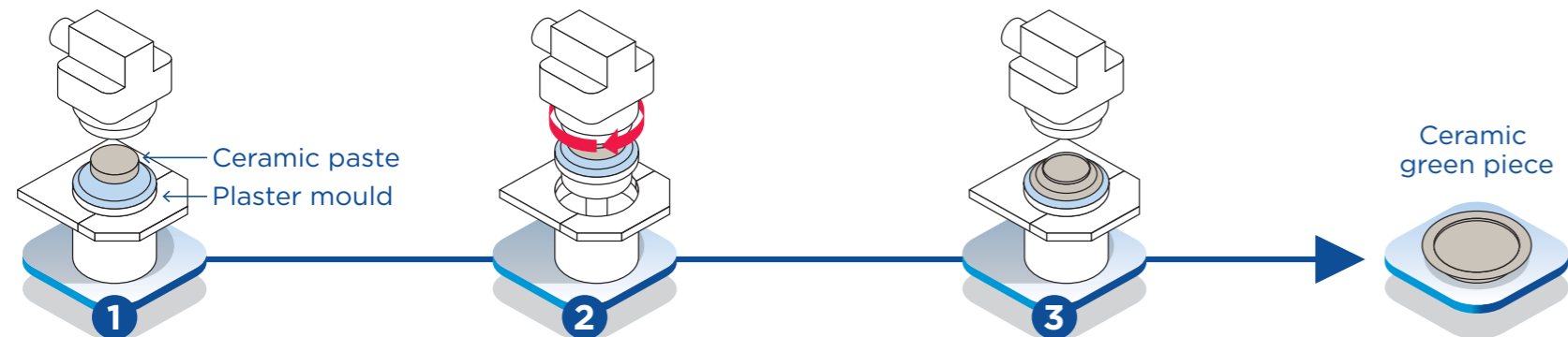
- ▶ Up to 20% increase in mould life
- ▶ Up to 5 casts/day
- ▶ Stable mould making process



Product				Benefits
Supraduro SN 75C		1.50:1	10 - 15 min	- Design for tableware and sanitaryware - Multipurpose for jiggering and slip casting - Combination of good mechanical properties and fast thickness.
Supraduro MC 70Q		1.35:1	12 - 16 min	- Multicasting plaster - High absorption capability
Supraduro MC 70QV		1.35:1	12 - 18 min	- Design for slip casting in sanitaryware - Strong absorption, fast thickness Superior - product for multicasting
Supraduro MC 70QS		1.35:1	8 - 12 min	- Designed for multicasting in tableware - High water absorption capacity - Fast setting time to increase mould productivity

# JIGGERING

## HARDER PLASTER PERMEABILITY



To improve productivity in ceramic piece manufacturing, the jiggering and jollying techniques were developed using malleable clay bodies, formed on plaster moulds, for all pieces that have an axis of revolution (circular profile: plates, cups, etc.).



### Jiggering main advantages

- ▶ Mould life is significantly extended compare to slip casting.
- ▶ Harder plaster due to higher plaster to water ratio.
- ▶ Mould porosity is no longer a critical quality; overriding quality here is air permeability to enable effective use of the vacuum suction.

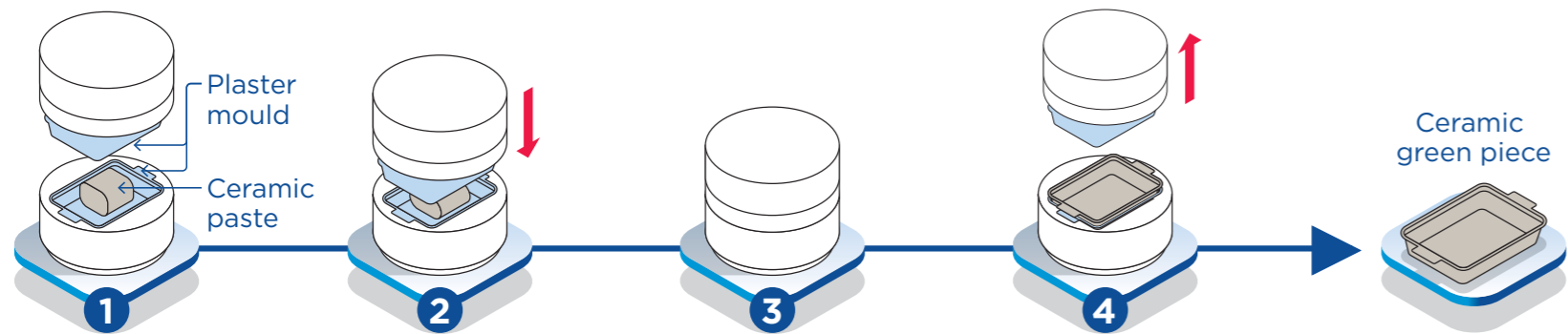
Saint-Gobain Formula can evaluate your needs and propose the best value for money according to the mould life requirement (depending of the production organization, process habits or tableware series size).

Product				Benefits
Supraduro TW 59		1.70:1	7 - 12 min	- High mechanical properties - Very fine surface details - Control expansion
Molda TW 56		1.82:1	6 - 16 min	- Designed for jiggering - High mechanical properties - Very fine surface details - Controlled expansion
Molda TW 63		1.63:1	7 - 11 min	- Good balance between mechanical properties and permeability - Controlled in expansion
Supraduro MC 60		1.66:1	8 - 13 min	- Multipurpose for jiggering and multicasting - Good mechanical properties and water absorption
Supraduro MC 65QL		1.66:1	8 - 13 min	- Multipurpose for jiggering and multicasting - Quick setting time - Controlled expansion



# RAMPRESS

## HARDER PLASTER PERMEABILITY AIR NETWORK



Thanks to our expertise around the world, Saint-Gobain Formula can provide technical support on mould making process.

Ceramic body with high plasticity is shaped by exerting pressure, using two halves of a mould made of very hard plaster, embedded with a porous network of porous non-metallic flexible tubes/air hose. Air is blown into this network during the setting process thereby ensuring that the mould is porous enough, to enable the clay piece to be demoulded after it is formed.

### RAM Press main advantages

- ▶ Mould life: more than 1000 pieces can be pressed depending on the raised surface pattern, the type of plaster and the manufacturer's quality requirements.
- ▶ Ram press moulds are formulated in order to ensure best mechanical properties and to help the permeability required to evacuate water included in the clay.
- ▶ Dimensional expansion of plaster mould is more important. Formula specifically controls expansion of every ram press product.

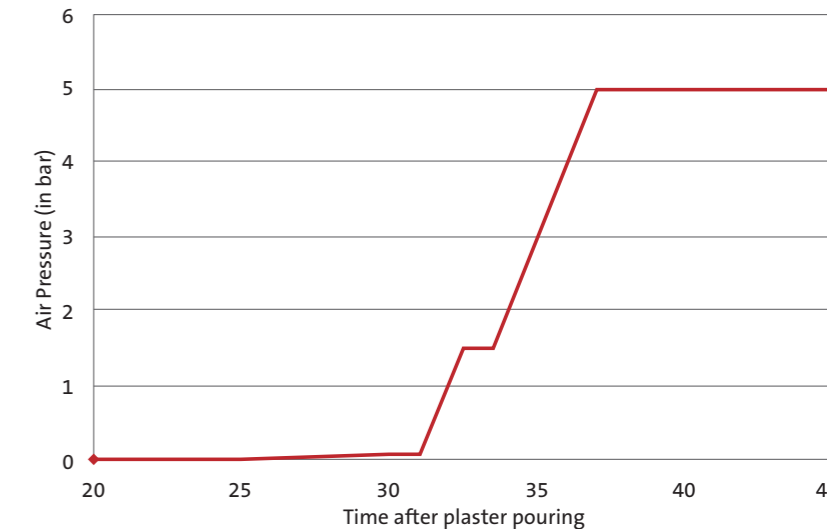
# BEST PRACTICE RAMPRESS

### SPECIFICITY OF PLASTER MIXING

- ▶ Controlled slip temperature.
- ▶ Mechanical mixing: mixing time from 5 to 10 min.
- ▶ Compressed air activation:
  - Push the thermometer into the plaster to a 2cm depth.
  - The compressed air circuit should be connected (manometer set to 0) during the minute following the end of setting (measured with Durometer Shore A = 40), this corresponds to a rise of 5°C in temperature.

### PLASTER PREPARATION SPECIFICITIES: INSTALLING POROUS AIR HOSE

Galvanised Grid	To hold the air hose
Air hose diameter	5 to 6 mm
Air hose position distance from the shape	25 mm to 30 mm
Air hose position distance between 2 lines	25 mm
Air hose position distance from the edge	30 mm minimum
Air blowing input	from the centre to the edge



Time (min)	Pressure (bar)	Step
0	0	Plaster introduction to water
20	0	Initial setting time
32.5	1.5	First water
35	3	Mould removing
45	5	All the water is eliminated







Product				Benefits
Keradur 4000P		3.00:1	19 - 25 min	- High strength - Controlled expansion

## CASE MOULDS

# HIGH STRENGTH LOW EXPANSION

Saint-Gobain Formula proposes extreme hardness and flawless dimensional stability plasters for case moulds. Such moulds are used to prepare working moulds for casting, jiggering and ram press applications.

Product				Benefits
Olafdur		3.33	9 - 14 min	<ul style="list-style-type: none"> <li>- Very high strength</li> <li>- Very high dimensional accuracy (limited in expansion)</li> </ul>



## BEST PRACTICE

### PLASTER TO WATER RATIO

- ▶ Weight each mix accurately.
- ▶ **Always add plaster to the water**, NOT water to plaster.
- ▶ Allow the plaster to soak at least one minute (to help remove the air and allow each particle to be saturated with water).
- ▶ Respect the mixing ratio, plaster to Water Ratio (PWR) mentioned in our Product Datasheet:
  - Plaster to water ratio too high: plaster becomes too thick and it could lead to air bubble entrapment.
  - Plaster to water ratio too low: plaster particles may sink before the plaster sets (giving an uneven quality and abnormal mould swelling, with the additional risk of hairline cracks). Tiny air bubbles may be trapped under mould surface which will start to appear as the mould starts to wear. A low plaster to water ratio increases the mould's absorption capacity to the detriment of its mechanical strength.



### CLEANING

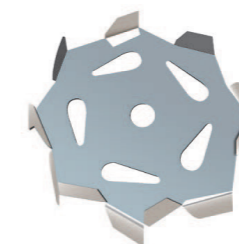
- ▶ Gypsum is a very powerful setting accelerator. Cleaning all the blending equipment after every mix is highly recommended.

### BLENDING

- ▶ Use only mechanical blending
- ▶ Type of blenders :



**Type of Blender :**  
3 blade propeller  
**Diameter of the blade :**  
1/4 to 1/3 high of the mixing bucket  
**Mixing speed:**  
200 rpm to 400 rpm  
**Mixing time:**  
2 to 5 minutes



**Type of Blender:**  
Defloculating Turbine  
**Diameter of the blade :**  
Less than 1/4 of the mixing bucket  
**Mixing speed:**  
900 to 1500 rpm  
**Mixing time:**  
2 to 5 minutes

- ▶ Use automatic equipment to ensure perfectly reproducible conditions everytime.

### TYPE OF WATER:

- ▶ Low dissolved salt (< 400 ppm), to avoid risk of efflorescence.
- ▶ Temperature between 15°C and 20°C.

### DRYING

- ▶ Good drying ensures good mechanical properties and consistent mould life.
- ▶ Drying should start 10-12 hours (minimum) after mould making.
- ▶ Temperature < 40°C in dry condition.



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