

# PLASTER BOOK



CASTING PLASTER  
CERAMIC INDUSTRY PLASTERS  
DENTAL PROFESSION PLASTERS



**CLAYMAN**  
Supplies Limited

where quality comes as standard

# PLASTER

Our plasters are derived from gypsum, one of the earth's most versatile minerals. From mines in Nottinghamshire high purity gypsum is taken, heated to drive off the chemically combined water (a process known as calcination). The resulting fine powder is known as plaster. When plaster is mixed with the appropriate volume of water, it "recovers" the water it possessed prior to calcination and "sets" to an inert and solid mass of substantially the same composition as the original mineral.

There are two principal types of plaster; the first is "beta" plaster. 4001 Fine Casting Plaster is an example. The second type is "alpha" plaster. This requires less water than beta plaster for a pourable mix and provides superior strength and reproduction of detail. 4052 Herculite Stone is an example.

Artists and craftsmen have used gypsum plaster for many centuries. The Egyptians, the ancient Greeks and Renaissance Italian artists all used plaster.

Today's artist or craftsman is demanding more from plaster than ever before. Casting plasters can be used to produce articles, which, although made in quantity, retain an excellent design standard together with aesthetic appeal. As merchants for British Gypsum's Industrial Plasters we offer a range of plasters from stock for use by specialised makers of giftware or ancillary building products as well as the hobbyist.

Our specialist plasters are predominately white but can have pink or grey shading. They may contain small quantities of non-gypsum material. Colour consistency cannot be relied upon.

The listed products are not suitable for use in external applications or in areas subject to damp or continuously damp or humid conditions. They are also not suitable for use in locations where the temperature exceeds 43°C (110°F). Time and conditions in storage will affect the physical properties of gypsum plasters.

We divide our plaster into three groups:

## CASTING & DISPLAY PLASTERS

These are the type of plasters that are used for the finished item. From fridge magnets to wall hangings, from figurines to decorative columns, ceiling roses, fire surrounds etc all will be made from plasters within this group.

## CERAMIC INDUSTRY PLASTERS

This group contains the plasters used by the ceramicist or mould maker. This group features plasters for making working moulds.

## DENTAL PLASTERS

This is a small group of specialist plasters used by the dental profession or prosthesis manufacturer. Often plasters are used outside of their intended range. Dental Plaster is an example of this. Over the years this particular plaster has been used by many craft workers (This plaster is no longer stocked).

## CERAMIC INDUSTRY PLASTERS

This group contains the plasters used by the ceramicist or mould maker. This group features plasters for making to the working moulds.

### 4020 - KERAMICAST

Mixing Ratio: 100/55

Pack Size: 5kg tubs, 25kg sacks

An off-white plaster that can have pink or grey shading for higher strength working moulds. Although originally developed for the jigger and jolley process, it can be used successfully for slip casting, where increased mould life is required. Vicat setting time: 15-30 minutes.

### 4003 - POTTERS PLASTER

Mixing Ratio: 100/65

Pack Size: 5kg tubs, 25kg sacks

An off-white plaster which can have pink or grey shading for castware, sanitaryware, jollied or press moulds. Vicat setting time: 15-30 minutes.

## DENTAL PLASTERS

This is a small group of specialist plasters used by the dental profession or prosthesis manufacturer. Often plasters are used outside of their intended range. Dental Plaster is an example of this. Over the years this particular plaster has been used by many craft workers.

### 4012 - SURGICAL

Mixing Ratio: 100/60

Pack Size: 25kg sacks

An off-white plaster that can have pink or grey shading for higher strength working moulds. Although originally developed for the jigger and jolley process, it can be used successfully for slip casting, where increased mould life is required. Vicat setting time: 15-30 minutes.

## CASTING & DISPLAY PLASTERS

These are the type of plasters that are used for the finished item. From fridge magnets to wall hangings, from figurines to decorative columns, ceiling roses, fire surrounds etc all will be made from plasters within this group.

### 4006 - FINE CASTING PLUS

Mixing Ratio: 100/70

Pack Size: 5kg tubs, 25kg sacks

A basic casting plaster. It is off-white in colour and can have slight pink or grey shading. Of medium hardness; it can be easily carved and turned. May be used for simple ceramic moulds. Vicat setting time: 12-30 minutes.

### 4030 - HERCULITE 2

Mixing Ratio: 100/42

Pack Size: 5kg tubs, 25kg sacks

A hard white plaster for use where colour, high strength and surface durability are required. Vicat setting time: 6-25 minutes.

### 4035 - CRYSTACAL ALPHA K

Mixing Ratio: 100/21

Pack Size: 5kg tubs, 25kg tubs

A super hard, low expansion plaster where maximum strength and surface hardness are required. Vicat setting time: 20-35 minutes

### 4033 - CYSTACAL R

Mixing Ratio: 100/35

Pack Size: 5kg tubs, 25kg sacks

A hard white plaster for use where high strength and surface hardness are important. Longer working than Herculite 2 with a lower expansion or setting. Vicat setting time: 10-25 minutes.

### 4034 - CRYSTACAST

Mixing Ratio: 100/28

Pack Size: 5kg tubs, 25kg sacks

An extra hard plaster for use where a fluid mix is required in conjunction with great strength and surface hardness. Vicat setting time: 12-25 minutes.

## MIXING

Weighed quantities should always be used. The bulk density of plaster is variable and so measurement by volume is not reliable. Records should be kept of the plaster water ratio used in each type of cast so that mixes can be adjusted accordingly.

Use clean water only. It should be as pure as possible. Usually if water is drinkable, it is suitable for mixing plaster. For consistent results, a constant water temperature should be maintained. Ideally, this should be in the range 16-20°C (61-68°F)

Ensure all containers and tools are clean and free from set plaster. Do not mix fresh material with plaster that has been mixed some time previously.

## HAND MIXING

1. Weigh the plaster and water accurately for each mix.
2. Sift or strew the plaster into the water slowly and evenly. Do not drop handfuls of plaster into the water. Always add the plaster to the water, never the reverse.
3. Allow the plaster to soak for at least one or two minutes. This soaking period removes air and allows each gypsum particle to be saturated with water so that it is easily dispersed during mixing. While waiting, the sides of the container can be tapped to bring air bubbles to the surface.
4. Mix as required by stirring. This is best done by placing an outspread hand into the bottom of the container and stir. Keep the stirring action below the surface of the water so as not to entrap any additional air. Move the hand from the bottom to the top breaking up any lumps encountered. Skim off any air bubbles or scum that may have risen to the surface. Mixing will take 2 to 5 minutes, depending upon the type of plaster being used, the plaster water ration and the quantity being mixed.
5. Gradually, the mix will change consistency and begin to take on a creamy, uniform texture; at this point it is ready to pour.
6. Pour lifting the mix carefully over the mould and gently pour in a thin continuous stream in one spot, letting the plaster flow freely up and around the inside of the mould until it crests just above the lip of the mould. Tap the sides and shake the mould to release air bubbles that will rise to the top.
7. After the mould or moulds have been filled, pour the excess plaster remaining in the mixing container into a waste bin and clean the mixing bowl and any tools used. When the plaster has begun to set, remove the excess plaster on the mould by scraping the plaster flush with the lips of the case mould.

## MIXING & POURING

Permeability, porosity, hardness, strength and durability of plaster moulds are directly related to the mixing and pouring procedure.

The plaster/water ratio (consistency) is the amount of plaster used with a measured amount of water. For example, a 70 consistency mix would be 100 parts of plaster to 70 parts of water. It is always specified by weight and for consistent results weighted quantities must always be used. The bulk density of plaster is variable and so measurement by volume is not reliable. Records should be kept of plaster/water ratio used in each undertaking and the final results that are achieved, so that mixes can be adjusted accordingly. The mix can be made more fluid by increasing the proportion of water. However, increasing the water content of the mix will result in reduced strength, hardness and expansion. Conversely, reducing the water content increases strength but reduces porosity and permeability.

As a guide, it has been found that weak mixes of pottery plaster below 100/800 can result in poor mould life. Thicker mixes of over 100/74 produce a more viscous mix that may entrap air and also reduce the quality of the cast pieces from the mould. Similar constraints apply when using Keramicast with a typical range of use between 100/77 and 100/67.

## MECHANICAL MIXING

1. Weigh the plaster and water accurately for each mix.
2. Sift or strew the plaster into the water slowly and evenly. Do not drop handfuls of plaster into the water. Always add the plaster to the water, never the reverse.
3. Allow the plaster to soak for at least one or two minutes. This soaking period removes air and allows each gypsum particle to be saturated with water so that it is easily dispersed during mixing. While waiting, the sides of the container can be tapped to bring air bubbles to the surface.
4. Use a mechanical mixer and mixing bucket of an appropriate size and design. Mechanical mixing considerably reduces the required mixing time. The time taken will depend upon the type of plaster used, the plaster water ratio, the volume of the mix as well as the type of mixer used.
5. As a general guide, direct drive propeller mixers are the best. The propeller should clear the bottom of the container by 25-50mm (1 to 2 inches) and the shaft should be about half way between the centre and side of the mixing container. Mixer speed should not exceed 450rpm; a variable speed control can be of assistance. The propeller should force the mix downwards, but not form a vortex, which will induce air into the mix. All equipment must be kept clean to avoid causing accelerated set of the plaster mix.

## MOULD DRYING

Moulds should be dried before use. Better casting performance and longer mould life are achieved when moulds are dried slowly. The casts should be dried in a thermostatically controlled oven at a temperature not exceeding 40°C (104°F). Higher temperatures up to a maximum of 60°C (140°F) may be used, but it is essential to remove the casts as soon as they are dry, otherwise the surface will deteriorate.

The moulds should be dried so that the drying front moves away from the working surface. This will avoid the migration of soluble salts to the face of the mould. This can be achieved by protecting the face by single reverse drying cup moulds, drying with saddles or other suitable means.

When removing moulds from the drier, care must be taken to avoid cracking due to thermal shock arising from substantial difference between drier and ambient temperatures. This is particularly important in winter.

Moulds and patterns should be stored in a dry place at a temperature of about 16°C (61°F).

The plaster water ratios indicated relate to the water demand of each product under laboratory testing conditions. They are not necessarily recommended for practical usage. Practical proportions will depend upon individual requirements. The absorption of moisture by any gypsum plaster during storage may lengthen the setting time and reduce the strength of the set plaster.

The physical properties of plaster may change during its life. These can include a lengthening of set time and a reduction in set strength.

# MIXING RATIOS

Plaster Water Ratio by weight	Plaster	Weight of Plaster per pint of water	Weight of Plaster per litre of water
(Plaster = 100)		lb oz	kg
100:87		1lb 7oz	1.15kg
100:83		1lb 8oz	1.20kg
100:80		1lb 9oz	1.25kg
100:77		1lb 10oz	1.30kg
100:74		1lb 11oz	1.35kg
100:71		1lb 12oz	1.40kg
100:70	Fine Casting Plus	1lb 12.5oz	1.425kg
100:69		1lb 13oz	1.45kg
100:67		1lb 14oz	1.50kg
100:65	Potters Plaster	1lb 15oz	1.55kg
100:63		2lb	1.60kg
100:61		2lb 1oz	1.65kg
100:60	Surgical, Dental	2lb 1.5oz	1.675kg
100:59		2lb 2oz	1.70kg
100:57		2lb 3oz	1.75kg
100:56		2lb 4oz	1.80kg
100:55	Keramicast	2lb 5oz	1.82kg
100:53		2lb 6oz	1.90kg
100:51		2lb 7oz	1.95kg
100:50		2lb 8oz	2.00kg
100:45		2lb 12oz	2.22kg
100:42	Herculite 2	3lb	2.38kg
100:40	Herculite LX	3lb 2oz	2.50kg
100:35	Crystacal R, Crystacal Lamina	3lb 9oz	2.86kg
100:33	Herculite Stone	3lb 13oz	3.03kg
100:30	Dentstone KD	4lb 3oz	3.33kg
100:28	Crystacast	4lb 7oz	3.57kg
100:23		5lb 4oz	4.44kg
100:21	Crystacal Alpha K	5lb 15oz	4.76kg

## STORAGE

It is essential that plaster is stored under dry conditions and that bags should not be placed in contact with cold or damp surfaces such as walls or floors. Stored under dry conditions, plaster will have a minimum usable life of three months. Each bag is marked with the date of manufacture. The oldest plaster should be used first. Open or part used bags should be folded and closed after each mixing.

## DECORATION

Before applying surface decoration, the cast must usually be dry. A coat of an appropriate sealant may be necessary to ensure a uniform finish when painting.

## LIMITATIONS

The information given for plasters is intended only as a general guide. The production of plaster casts is complex and relies on craft as well as technical skill. The successful production of plaster casts will depend upon the individual circumstances.

# NOTES

## Contact details

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