



# Cast Stone

## A Guide For Architects

A Guide to Cast Stone Products  
for Architects and Specifiers



**Cast Stone**

First Choice Solutions for Architects, Specifiers & Contractors



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Cast stone is a remarkably versatile material, able to mimic natural stone in older properties, add character to new developments, or provide impact on commercial projects. Furthermore, it is very cost-effective, offers very reliable deliveries on short lead times (unlike natural stone) and is easy to design with. Extensive ranges of standard products are available either for delivery from stock or on short lead times, or bespoke products can be manufactured to order in colours and finishes that, to the untrained eye, are indistinguishable from natural stone. Architects particularly like the design freedom offered by cast stone; almost any three-dimensional geometric form can be cast, incorporating elegant curves as well as straight-edged features and intricate details.

## Applications

As a cost-effective alternative to natural stone, cast stone has historically been used for repairs, alterations and extensions to older properties. Likewise, it is popular for new developments that are designed to blend in with their older surroundings, or where planning authorities insist on traditional features for developments in sensitive areas.

Another very popular use for cast stone today is in prestigious properties where the desire is to add style and impact. Traditionally a large house might feature natural stone porticos, balustrades and arches, yet these are expensive and deliveries of natural stone can be unpredictable. Instead, cast stone enables all of these features - and many more - to be added very easily, and without unduly impacting on the budget.

Even a one-off cast stone product can be cost-effective compared with natural stone, but one of the advantages of cast stone is that the manufacturing process uses reusable moulds. When products are manufactured in higher volumes, the economies of scale make cast stone extremely attractive. For that reason, cast stone is an excellent way to add perceived value - as well as character and style - to housing developments. Research has shown that cast stone makes residential developments more attractive to prospective purchasers to the extent that they would be prepared to pay more - much more than the marginal additional cost of using cast stone.

So far we have described how cast stone can be used to mimic traditional stone products, but cast stone can also be used as a facing material in its own right. For example, commercial or retail properties can benefit from cast stone, sometimes making good use of non-standard colours for large areas.



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## What Is Cast Stone?

Cast stone, which is sometimes referred to as reconstituted stone or simulated stone, starts with an architect's drawing, from which subsidiary drawings are prepared so that a skilled pattern maker can create a wooden mould. Depending on the product and finish required, cast stone is made using a semi-dry mix of white and/or grey cements with natural or manufactured sands. The appearance of natural stone is achieved using crushed natural stone, well graded natural gravels and mineral pigments. A waterproofer is also added to minimise moisture absorption and improve resistance to frost damage.

On larger components, a coloured facing mix is used on the outside of the mould, with a higher-strength, non-coloured backing mix in the interior. Cores are sometimes used to reduce the volume of cast stone used and, therefore, the weight of the final product; reinforcement can also be incorporated to enhance the structural strength. Additionally, bosses for lifting eyes can be set within the casting to ease handling on site.

During mould-filling, the semi-dry mix is compacted using a vibratory ram. The casting is turned out almost immediately, enabling the mould to be reused straight away if required, and the cast unit is allowed to cure initially in a controlled environment and then naturally. In extreme circumstances, cast stone products can be manufactured and delivered to site within approximately two weeks, provided the correct mould is available.

After installation, cast stone weathers in the same way as natural stone. If required, it can also be cleaned or repaired, and conventional masonry fixings can be used to attach other items.

Products intended for use in compression - such as quoins, string courses and walling units - can be structural. However, cast stone lintels and other units that might experience tensile loads should be used in conjunction with a suitable structural lintel.



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## Design Freedom

Almost any three-dimensional geometric form can be cast, including curves and straight-edged features. Additional detail can also be incorporated into the surface, such as brick-effects, channels or decorative designs, and the edges of units can be square, bevelled or radiused. Cast stone offers greater design freedom than natural stone as, for example, slender units can be manufactured with integral reinforcement, which would not be possible with natural stone. However, the 'slenderness' ratio of the unit's length to its 'diameter' (an inscribed or superscribed circle on the section of the product, determined by the support plane) should be less than or equal to 15 unless otherwise agreed with the manufacturer.

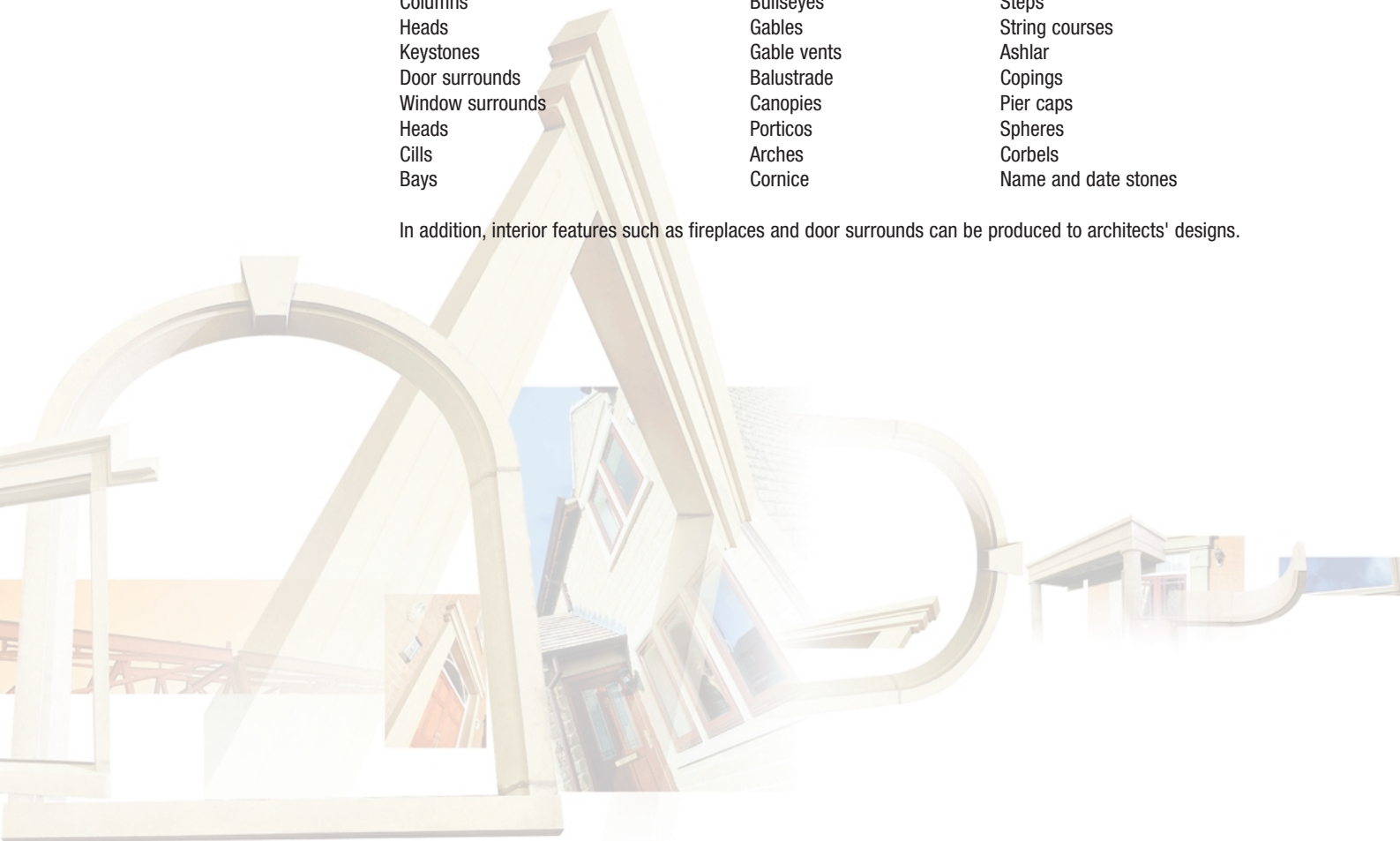
Cast stone units can complement brickwork, natural stone, flint or rendering. Standard colours are available to match those of natural stone, such as Yorkstone, Bathstone, Red Sandstone or Portland stone, while non-standard colours can also be produced to meet a client's specific requirements. Note that the colour is exceptionally consistent, both between units manufactured within the same batch and from one batch to the next. This is in contrast to the lack of consistency available from quarried stone. Colour samples can be supplied so the architect - and client - can see the actual colour and finish.

Various surface finishes and textures can be achieved using the cast stone process, so it is essential that architects discuss their requirements with the manufacturer. This is especially so if exceptionally smooth surfaces are being considered, as the type of finish has a significant effect on the overall appearance of the product.

Any exterior feature that might be cut or carved from natural stone can also be executed in cast stone, such as:

Columns	Bullseyes	Steps
Heads	Gables	String courses
Keystones	Gable vents	Ashlar
Door surrounds	Balustrade	Copings
Window surrounds	Canopies	Pier caps
Heads	Porticos	Spheres
Cills	Arches	Corbels
Bays	Cornice	Name and date stones

In addition, interior features such as fireplaces and door surrounds can be produced to architects' designs.



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## Working With Cast Stone

As stated above, a cast stone unit starts with a drawing, which today is usually in the form of a CAD file. Procter Caststone can accept CAD files from architects when bespoke products are being manufactured. Conversely, CAD files for standard products can be supplied to architects who wish to incorporate these within their designs.

If a design calls for numerous similar but slightly different units, Procter Caststone can ensure that these are delivered to site with suitable identifying marks. Corresponding unit location plans eliminate any ambiguity over where they need to be installed.

Whether standard or bespoke units are being considered, it is advisable to contact the manufacturer as early as possible. Doing so enables the cast stone units to be designed so as to minimise the manufacturing cost. There are also design tips that can be passed on, such as ensuring that there is one major flat unexposed surface for the open side of the mould (while this is not essential, not having a major flat unexposed surface increases the mould complexity and unit cost). Similarly, certain design details can be easier or more difficult to produce - and the difference is reflected in the price of the units.

When the architect is preparing the unit drawings, it is important to identify which surfaces will and will not be visible once construction is complete. This enables the manufacturer to incorporate threaded sockets for lifting hooks in positions that will not be seen.

As well as advising on design details for cast stone units, the manufacturer can also provide information relating to fixings, mortars, on-site handling, aftercare, cleaning and repairs.

Procter Caststone can arrange deliveries to site according to an agreed schedule. This avoids delays to site work due to late deliveries, plus the cast stone units do not spend any more time on site than is necessary, which helps site logistics and minimises the risk damage. Guidelines for handling are available to minimise the risk of damage. However, should an accident occur, minor damage can often be repaired on site, or replacement units can be manufactured and delivered to site within around two weeks.

Procter Caststone seeks to develop long-term relationships with clients by providing high-quality products and reliable, personal service. A dedicated planner is assigned to every project, large or small, to ensure that all aspects of the work meet with the client's requirements.

As with any other building material, it is vital to take care in selecting a supplier. There are many manufacturers of cast stone that do not adhere to quality assurance standards or even to the main standards relating to cast stone. Architects should satisfy themselves that their selected supplier will deliver a high-quality product and a high standard of service.



## Standards

The key standard for cast stone units is BS 1217:2008 Specification for cast stone. However, the following table also lists other applicable British Standards, European Standards and Eurocodes relating to the design, manufacture and use of cast stone products in the UK.

BS 743:1970	Specification for materials for damp proof courses
BS 1217:1997	Specification for cast stone
BS 3892-2:1996	Pulverized-fuel ash. Specification for pulverized-fuel ash to be used as a Type I addition
BS 3892-3:1997	Pulverized-fuel ash. Specification for pulverized-fuel ash for use in cementitious grouts
BS 4027:1996	Specification for sulphate-resisting Portland cement
BS 5628-1:2005	Code of practice for the use of masonry. Structural use of unreinforced masonry
BS 5628-2:2005	Code of practice for the use of masonry. Structural use of reinforced and prestressed masonry
BS 5628-3:2005	Code of practice for the use of masonry. Materials and components, design and workmanship
BS 5642-1:1978	Sills and copings. Specification for window sills of precast concrete, cast stone, clayware, slate and natural stone
BS 5642-2:1983	Sills and copings. Specification for copings of precast concrete, cast stone, clayware, slate and natural stone
BS 6073-2:2008	Precast concrete masonry units. Guide for specifying precast concrete masonry units
BS 6093:2006	Design of joints and jointing in building construction. Guide
BS 6100-6:2008	Building and civil engineering. Vocabulary. Construction parts
BS 6213:2000	Selection of constructional sealants. Guide
BS 6398:1983	Specification for bitumen damp-proof courses for masonry
BS 6399-1:1996	Loading for Buildings. Code of practice for dead and imposed loads
BS 6515:1984	Specification for polyethylene damp-proof courses for masonry
BS 8000-3:2001	Workmanship on building sites. Code of practice for masonry
BS 8104:1992	Code of practice for assessing exposure of walls to wind-driven rain
BS 8215:1991	Code of practice for design and installation of damp-proof courses in masonry construction
BS 8221-1:2000	Code of practice for cleaning and surface repair of buildings. Cleaning of natural stones, brick, terracotta and concrete
BS 8221-2:2000	Code of practice for cleaning and surface repair of buildings. Surface repair of natural stones, brick and terracotta
BS EN 197-1:2000	Cement. Composition, specifications and conformity criteria for common cements
BS EN 197-2:2000	Cement. Conformity evaluation
BS EN 197-4:2004	Cement. Composition, specifications and conformity criteria for low early strength blastfurnace cements
BS EN 450-1:2005 +A1:2007	Fly ash for concrete. Definition, specifications and conformity criteria
BS EN 771-3:2003	Specification for masonry units. Aggregate concrete masonry units (dense and light-weight aggregates)

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BS EN 771-5:2003	Specification for masonry units. Manufactured stone masonry units
BS EN 772-2:1998	Methods of test for masonry units. Determination of percentage area of voids in masonry units (by paper indentation)
BS EN 1744-1:1998	Tests for chemical properties of aggregates. Chemical analysis
BS EN 1992-1-1:2004	Eurocode 2: Design of concrete structures. General rules and rules for buildings
NA to BS EN 1992-1-1:2004	UK National Annex to Eurocode 2. Design of concrete structures. General rules and rules for buildings
BS EN 1996-1-1:2005	Eurocode 6. Design of masonry structures. General rules for reinforced and unreinforced masonry structures
NA to BS EN 1996-1-1:2005	UK National Annex to Eurocode 6. Design of masonry structures. General rules for reinforced and unreinforced masonry structures
BS EN 1996-2:2006	Eurocode 6. Design of masonry structures. Design considerations, selection of materials and execution of masonry
NA to BS EN 1996-2:2006	UK National Annex to Eurocode 6. Design of masonry structures. Design considerations, selection of materials and execution of masonry
BS EN 1996-3:2006	Eurocode 6. Design of masonry structures. Simplified calculation methods for unreinforced masonry structures
NA to BS EN 1996-3:2006	UK National Annex to Eurocode 6. Design of masonry structures. Simplified calculation methods for unreinforced masonry structure
BS EN 12620:2002 +A1:2008	Aggregates for concrete
BS EN 12878:2005	Pigments for the colouring of building materials based on cement and/or lime. Specifications and methods of test
BS EN 13055-1:2002	Lightweight aggregates. Lightweight aggregates for concrete, mortar and grout
BS EN 15167-1:2006	Ground granulated blast furnace slag for use in concrete, mortar and grout. Definitions, specifications and conformity criteria
BS EN 15167-2:2006	Ground granulated blast furnace slag for use in concrete, mortar and grout. Conformity evaluation

## Further Information

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The information contained in this publication is intended as a guide only and is believed to be correct at the time of going to press. However, it is the reader's responsibility to ensure that all necessary standards are complied with when specifying, installing or maintaining cast stone.

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