

# Factory produced lime:sand mortar for masonry



## General Information

Factory produced lime:sand is a blend of sand and lime to which cement is added on site, to produce a masonry mortar.

Over the last few years there have been many innovations aimed at enhancing the performance of factory produced mortars. Today, accurately weighed, batched and composed of quality assured constituents, they represent the quality way to obtaining good masonry.

## Composition and Manufacture

Mortar Industry Association members manufacture their mortars from carefully selected clean sand (now known as fine aggregate) conforming to BS EN 13139 and lime conforming to BS EN 459-1. Mortar mixes conform to BS EN 998-2, when tested by the methods given in BS EN 1015 and BS 4551. If required, pigments conforming to BS EN 12878 can be accurately added at the factory to produce an extensive range of colours and shades. The mortar is generally delivered in bulk. The table below shows mix designation, the compressive strength and the amount of cement to be added on site.

When ordering, make sure that the designation of the mortar is correct for the type of work and that if coloured mortar is being used, it is the agreed shade. With coloured mortars, it is recommended that a small trial panel be constructed to ensure that the interaction of the texture and colour of the bricks on the mortar will produce the effect required.

**Table 1: Mix designation, compressive strength and cement gauging**

Traditional mortar designation	BS EN 998-2 mortar class	Mortar by volume Cement:lime:sand	Factory produced by volume lime:sand	Site mixing Cement:factory produced		
				By volume	Lime:sand by weight kg:tonne	
				Air entrained	Non air entrained	
i	12	1:1/4:3	1:12	1:3	-	250
ii	6	1:1/2:4 - 4 1/2	1:9	1:4 1/2	190	170
iii	4	1:1:5 - 6	1:6	1:6	150	125
iv	2	1:2:8 - 9	1:4 1/2	1:9	100	90

**NB** Mortar class (compressive strength) as defined in the National Annex to BS EN 998-2:2003, clause NA.1

## Properties

Brickwork and blockwork constructed with these mortars should have adequate strength with a substantial safety factor, yet retain a degree of elasticity so that the inevitable movement of buildings during and after construction can be accommodated without cracking, which is both unsightly and a cause of high remedial costs. These mortars are suitable for all types of masonry applications, particularly housing and other medium and low rise structures.

For low rise buildings, a traditional designation iv mortar has adequate strength. In general, the mortar strength should not be greater than the strength of the units used. With some types of materials e.g. calcium silicate, aerated concrete and dense concrete, it is generally advisable to use a weaker mortar in order to reduce the effect of shrinkage stresses.

Bulk density of factory produced lime:sand for mortar	1850 - 2000 kg/m <sup>3</sup>
With air entrainment	1700 - 1850 kg/m <sup>3</sup>
Volume yield	1 tonne of factory produced lime:sand for mortar when mixed with Portland cement on site will yield 0.65 to 0.75 m <sup>3</sup> .
Coverage	1 tonne of cement:lime:sand mortar will lay approximately 1000 bricks or 600 blocks of nominal size 450 x 225 x 100mm.

### **Durability**

Factory produced lime:sand bricklaying mortars help to produce a permanent weatherproof and frost resistant joint through which rain will not easily penetrate. Cracking is minimal, but any that does occur tends to be self healing due to the combined effects of rainwater and the carbon dioxide always present in the atmosphere. The action of these will, by slow carbonation, tend to fill any cracks if they occur.

### **Working Characteristics**

Factory produced lime:sand mortars are well known for their plasticity and workability. They can completely fill the vertical as well as the horizontal joints in masonry assisting with the attainment of good quality workmanship. The mortar, whilst possessing a high degree of cohesiveness, spreads easily under the trowel thus increasing productivity and minimising wastage due to droppings.

They have high water retentivity enabling the mortar to resist the suction of the bricks and blocks and remain workable while laying is carried out. This helps to ensure good bond and reduces the need to retemper.

It is recommended that **deliveries** of factory produced lime:sand for mortar should be tipped, unless delivered in skips, onto a **clean area** with a sealed base, slab or similar prepared area and sheeted when not in use. **Sheeting** is most important when colour is a requirement, as rain and weathering may otherwise cause separation of some of the fine material.

To obtain the required mortar, considerable care should be taken on site to add the **correct amount and type of cement. Gauge boxes or other accurate measuring vessels** should be used when proportioning is by volume. When using coloured mortars, it is strongly advised that the same brand, type and source of cement is used throughout the contract. If possible, gauge by weight.

For the quantity of cement for the various designations of mortar, see the Table on the previous page.

Only **clean water** should be used for obtaining the correct consistency.

**Stacked bricks and blocks** should be protected. Never use either when saturated with water as this can cause disfiguration of the building and in winter, attack on the masonry by frost.

**New work** should be protected from rain at the end of the working day or when rained off. Scaffold planks placed along the top of walls give at least some protection from saturation by rain. Ideally, the tops of unfinished walls should be properly covered; this is especially important with cavity walls and where perforated bricks are used.

Although it is recommended to use cement:lime:sand mortars within 2-3 hours, most cement:lime mortars will remain fairly soft for a working day, making cleaning up at the end of each shift reasonably easy. All mixers, spot boards and trowels, etc., should be cleaned at the end of each shift or when changing the colour of the mortar.

### **Recommended Mortar Mixes for Various Conditions**

Reference should be made to British Standard BS 5628, having regard to the requirements for strength durability and appearance.

### **Maintenance**

Generally, walls constructed with mortars containing lime require the minimum of maintenance.

## References

BS EN 197-1	Cement composition, specification and conformity criteria for common cements
BS EN 459-1	Building lime. Definitions, specifications and conformity criteria
BS EN 998-2	Specification for mortar for masonry - Part 2: Masonry mortar
BS EN 1015	Methods of test for mortar for masonry
BS EN 12878	Pigments for the colouring of building materials based on cement and/or lime. Specifications and methods of test
BS EN 13139	Aggregates for mortar
BS 4551	Methods of testing mortars, screeds and plasters
BS 5628	Code of practice for use of masonry
PD 6678	Guide to the selection and specification of masonry mortar
PD 6682-3	Aggregates for mortar - Guidance on the use of BS EN 13139

British Standards are currently being revised in line with European requirements. The new standards are at varying stages of preparation and/or publication, for a full list of British and new European Standards see the MIA data sheet of technical references.



There is a real danger of contact dermatitis or serious burns if skin comes into contact with wet mortar. Wear suitable protective clothing and eye protection. Where skin contact occurs either directly or through saturated clothing wash immediately with soap and water. For eye contact immediately wash out eyes thoroughly with clean water. If swallowed wash out mouth and drink plenty of water.

The relevant codes of practice, standards and statutory regulations must always be observed.

The information in this data sheet may be freely copied with acknowledgement to the Mortar Industry Association. Current issue numbers of all MIA publications are available from the MIA website.



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Promoting quality factory produced mortar

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