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# HOW TO MAKE IDEAL INTEGRALLY COLOURED SAND & CEMENT MORTARS

Important Information for plasterers for solid 'plastering'/rendering, bricklayers for brick & block joint mortaring & tuck pointers for brick wall joint tuck-pointing. Tuckpointers please ask for our printed data, reference: "Cement Render". Factual information also for builders, architects, landscape architects, civil engineers, building consultants and building trades teachers.

**THE FOLLOWING ARE GENERAL RECOMMENDATIONS FOR THE READERS CONSIDERATION USING A TYPICAL BARREL CEMENT MIXER (OR FOR MUCH *SHORTER* MIXING TIMES AND MORE *EFFICIENT* MIXING A *FORCED ACTION MIXER* WITH MOVING BLADES) FOR PROCEDURES THAT AFTER *YOUR* PRIOR TRIALS AND TESTING CAN RESULT IN THE SUCCESSFUL PRODUCTION OF NON-FADING *COLOURED* CEMENT MORTARS.**

**DELIGHTFULLY COLOURED MORTARS THAT ARE ALSO LOW SHRINK AND THEREFORE HAVE A LOW RISK OF CRACKING. MORTARS THAT TEND TO BE HIGHER IN STRENGTH AT ALL AGES AFTER SETTING, MORE DURABLE, FIRMLY ADHERING, WATERPROOF/WATERTIGHT AND WATER REPELLENT, EFFLORESCENT BLOOM-FREE AND BEING COLOUR-THROUGH, DO NOT NORMALLY REQUIRE FURTHER DECORATING BY PAINTING AND ARE MAINTENANCE-FREE.**

***THE AIM THEREFORE IS TO MAKE AND APPLY MORTARS THAT HAVE LOW WATER:CEMENT RATIOS AND ARE PROPERLY CURED BY A SUITABLE PROCEDURE.***

**BASIC REQUIREMENTS:**

☑ To keep the water content as ***low*** as possible, mix the mortar *thoroughly and, immediately* after it has set in place *without delay*, it is wise to adopt a suitable *procedure* to *cure it properly*. Curing is a procedure, to prevent the mix water from evaporating.

☑ To adopt a policy of *complete* uniformity and consistency with regard to the sourcing, supply and use of the relevant raw materials such as using only *fresh* cement and the carrying out of ideal application procedures.

## CAREFULLY & SAFELY:

1. To make a good coloured mortar, *carefully* and *safely* add clean, drinkable water to a suitable operating mixing machine. *Reduce* the "normal" quantity by about 20% ($^1/_5$).
2. Add the required amount of *fresh* cement. Use only the ***freshest*** Portland cement obtainable. Stale or lumpy cement is NOT recommended. Off-white cement (Australian Standard Type HE) with or without a white oxide colouring pigment powder such as 'abilox®' Illumin-ite White oxide added to make the mortar whiter and/or to achieve a lighter and often a brighter colouring effect with a colouring pigment can be used instead of grey cement (Type GP).
3. Add hydrated lime, if required*.
4. Do NOT use a 'Mortar Plasticising' admixture (AEA - Air Entraining Agent) to increase workability of the mortar as it is already contained *at a controlled amount* in 'EFFLOREIN® Mark 2 - (see item (9) overleaf) and is therefore NOT necessary. Too much AEA causes mortar weakness and reduces durability.
5. Do NOT use a waterproofing admixture as this is also contained in 'EFFLOREIN® Mark 2. (Also see item No 9).
6. Add the sand. Use the **coarsest** particle size grade possible. Fine sands compared with coarser grades demand more water for the same mortar consistency! The more water used the weaker, poorer and less durable the result. Also, for consistent results ensure that the sand grade selected is available for the **complete** job. We recommend a good washed concrete sand.
7. Add the selected 'abilox®' UV resistant colouring oxide pigment powder at the specified dose rate. This is usually five (5) to ten (10) 'Coke' cans full per standard 10 litre bucket full of cement.

   'abilox®' is available from Ability in 60 standard colours ex stock in either 25kg or 12.5kg net paper sacks. For relatively large jobs, Ability may custom-make a special colour for you.

**PLEASE TEST FIRST. TRIALS ARE ESSENTIAL.**

8. Mix all these raw materials *thoroughly* in the mixer for at least five (5) minutes (even *longer* if possible) ***without* adding extra water.** Even though this mortar mix will initially be of a much more 'dryish' consistency than normal, we suggest that you strongly ***control*** the natural human urge to add more water!
9. Add ability's **'EFFLOREIN®' Mark 2** powder admixture** at an ideal dose rate ***directly into the mix***. In terms of a volume dose amount we suggest you try two (2) 375 ml 'coke' cans full per full standard 10 litre bucket (about 20kg) full of fresh cement used in the mortar mix and carefully evaluate the result.
10. The recommended dosage ***weight*** for 'EFFLOREIN®' Mark 2 is 1½% of the cement or total cementitious powder binder weight (1.5kg/100kg cement/cementitious powder).
11. *Please be patient* and *continue* mixing until the mortar becomes a 'plastic' semi-liquid and of normal or better than normal application consistency ***without* adding more water.**
12. Mix for a *further* five (5) minutes before using the mortar. If the mortar materials and their proportions are mixed adequately *without* adding more water, the mortar should after this extra mixing time be of *excellent* trowellable consistency. Apply by suitable trowel or float to surfaces which are or have been prepared to make them firm, sound and clean and which have been lightly but uniformly dampened.
13. After its application protect the applied mortar from rain and very importantly *immediately* once it sets adopt a suitable procedure to prevent the evaporation of the mortar's mix water (curing). For example: intermittent water spraying or hanging wet hessian cloth over mortar work which is kept damp for at least three (3) days - preferably longer - over a recently masonry mortar or rendered wall. Keep the hessian constantly wet and leave it up for seven (7) days which is good, and for 28 days - excellent!

Alternatively, a liquid curing compound coating such as Ability's **'Duro-Seel'** may be applied liberally (preferably one or two days after an intermittent water spray curing procedure) to all mortar surfaces exposed to the air.

Applied liberally, this coating prevents almost 80% of the original mix water from evaporating for a *long* period of time. The preferably low quantity of mix water in the mortar is therefore, made available for *continuing* chemical combination with the cement (hydration) until the maximum bond, flexural and compressive strength, hardness, and watertightness of the mortar is reached in about a month.

Ability can *also* supply you with '**E-SPHERES®**', which are *strong* hollow ceramic macrospheres and microspheres. These are available in six (6) different size grades. 'E-SPHERES®' look like sand. By replacing some or all of the actual sand in normal mortars, 'E-SPHERES®' are used to make **lightweight**, but strong mortars - particularly those that are used for rendering walls.

'E-SPHERES®' give mortars *high* insulation qualities to both temperature and sound ie acoustic and thermal (heat and cold) insulation.

You can contact Ability to request a **STARTING POINT** MIX DESIGN OR FORMULA USING 'E-SPHERES®' FOR MAKING INTEGRALLY COLOURED (OR PLAIN UN-COLOURED), *LIGHTWEIGHT* BUT STRONG AND INSULATIVE MORTARS either coloured with 'abilox®' cement colours or plain, uncoloured for your clients' evaluation and ADEQUATE testing by YOU (or arranged by you) ***prior*** to actual use.

* Hydrated lime adds extra lasting qualities and can help to make the mortar even more workable than is achieved with 'EFFLOREIN®' Mark 2 alone and after it hardens more resistant to weathering, cracking, chemicals and fire. However if used**, more oxide cement colour will be required** for the same intensity of colour compared with a plain Portland cement mortar **without** hydrated lime. Also, the important procedure of curing (mix water retention - to be commenced immediately after the mortar sets) should be **extended** by 3 or 4 days. If this is not done, even with the 'EFFLOREIN®' Mark 2 admixture, efflorescence (a white salt bloom) can occur.

** Do NOT mix 'EFFLOREIN®' Mark 2 with water before use. Simply add it to the ***prepared*** mortar mix and always mix it in ***thoroughly***.

*** If the mortar is required to have a highly flowable consistency such as for spray application or gravity filling into narrow sections or holes or the applicator is required to use even less water than indicated to with curing increase strength adhesion and performance further, Ability's **'COSMOTRON® DPU-AC** instantly dissolving powder super plasticising admixture can be added separately to the mix (added separately but in **combination** with 'EFFLOREIN® Mark 2). The suggested dose rate is ½ a 'coke' can full (½ x 375 ml = 188 ml) per standard 10 litre bucket full of cement or cementitious binding *material (0.4% of cementitious binder weight) between stages 8 and 9. Further printed information about COSMOTRON® DPU-AC and 'EFFLOREIN®' Mark 2' high performance admixtures is available by contacting Ability.*

**PLEASE *REMEMBER* THAT GOOD DURABLE MORTAR (AND GOOD CONCRETE) - COLOURED OR PLAIN - IS MADE:**

1. with the ***lowest*** practicable amount of water *compared* with the cement and/or lime - the *cementitious* binder content.
2. by keeping this relatively low amount of water inside - within the set but not fully hardened mortar by means of *preventing* it from evaporating. This evaporation prevention or curing is achieved by means of adopting a suitable procedure. The procedure called 'curing' MUST commence IMMEDIATELY after the mortar sets and last for three (3) - preferably seven (7) or even more days. A period of 28 days is virtually IDEAL because it takes this long for the mortar to reach about 85% of its hardness and mechanical strengths.
3. concrete and mortars made with Portland cement have, 24 hours after they set, with the adoption of the procedure of curing, only about 26% of their ultimate attainable strengths. At 28 days *with* curing, this is increased to about 85% of their ultimate or final strengths. The ***importance*** of adopting a suitable procedure for curing between and after these periods of time should therefore *not* be overlooked. Remember that a decision not to cure is like leaving the hardener out of a 2 pack epoxy resin product! If there is no water, nothing further happens!