GENERAL GUIDELINES

NHL Renders

NHL Renders

General information
Sands for renders
Background preparation
Two coat work
Three coat work
Protection
Good working practices
Render Diagnostics
Some recommended mixes

Other General Guidelines documents:

Render on cob
Render on wooden lath
Render on metal lath
Render on blocks
Rendering with a spray gun

GENERAL GUIDELINES

NHL Renders

General Information

The correct specification for any render should consider the nature and condition of the background, site exposure, time of the year (weather maps / rainfall and wind driven rain indices are available from the BRE) and type of finish required.

The success of a render depends on ensuring good background preparation and suction control, the correct choice of a mortar and its application. Sample panels should always be carried out.

The durability of a render depends on mortars that will adhere to the background, are able to breathe and resist harsh climatic conditions that can and do occur even in relatively benign climate zones. A good bond to the substrate and between all coats is essential to the soundness of the render structure. Bonding is both physical and mechanical:

- A physical bond is achieved by controlling the suction correctly, such that a suction bond develops. The natural surface condition can also offer a good key.
- Mechanical bonding is induced by the method of application. Ensuring good keying between layers, and especially the first coat, by casting/harling or spraying is by far the most successful method.

To avoid potential de-bonding and cracking each coat should be not be richer in binder or thicker than the preceding one (thicker base coats are applicable on thin stipple/scratch coats).

Sands for renders.
In dubbing out, stipple coats and base coats the sands should be well graded, washed and free of clay/silt (particles below 0.075). Use sharp sands from 3 or 4mm, down to 0.075mm, with the bulk of the sand in the 1.18mm/0.6/0.3/0.15 range. Fine sands or monogranular sands (bulk in 1 or 2 grades only) are to be avoided.
In finishing coats, finer sands, still well graded, can be used for smooth finishes (avoid overtrowling). Particular attention will have to be paid to finishing coats with fine sands to avoid high shrinkage due to the high amount of water that fine sands absorb. The use of a wooden float, energetically applied in small circular motions, will help. Floating with plastic floats is not suitable. Sponge floats can be used after the wooden float work is completed to achieve a particular texture in the finish. Curing will also be important. Small hairline shrinkage cracks can be healed if treated in time with a light water mist.

Note: the finer sand particles are the ones mostly responsible for colour and therefore used for colour rendition. If the fines denote presence of clay (particles below 0.075) the NHL binder quantity should be reduced (clays are also binders!). A wet sieving analysis is recommended to check clay / silt content.

GENERAL GUIDELINES

NHL renders

Background preparation

Check that any movement cracks are stable and where necessary ensure they are properly tied and if needed, grouted/pinned/pointed. Careful removal of existing renders will result in less remedial repairs prior to re-rendering. Removal of failed or inappropriate existing render or finishes, including many types of paint, may require the walls to be left to dry out properly before re-rendering and time should be allowed for this. Ensure all repairs to the background are completed and that loose pinning stones or defective bricks are repaired or replaced prior to commencement of any rendering. Partial or complete re-pointing / consolidation may be required. Remove all loose and friable materials, remove and treat all organic growth, use biocides where applicable, ensuring that they will not affect the mortar.
Newly built walls should be allowed to dry properly, usually 1 month. This will not take place readily in winter conditions.

Repointing before rendering: if this is necessary it should be done with a compatible mortar.

Detailing: inspect all details, i.e. copings etc. Check gutters and down pipes and all forms of roof drainage, ground drainage and general ground conditions. Make sure all the above items are functioning

properly and where remedial action is required, ensure it is completed before proceeding with render work.
Rendering should never come into contact with soil. Renders should be kept clear of the ground or finish at the base of a wall into free draining gravel.

Dubbing out: on defaced surfaces or in areas with a large amount of damaged joints it will be necessary to apply a dubbing out coat to provide a level surface. In most cases this will be sufficient with mortar, however very deep joints or hollows should be pinned to reduce the mass of mortar. When a dubbing out coat is used, let it set sufficiently (8-10 hours) before scraping it and keying it. Apply the first coat after approx. 2 days (more if very deep recesses have been filled) and depending on weather conditions.
Dubbing out should leave a relatively flat surface, keyed as necessary, on which to render.

Suction control: if needed, apply sufficient water to reduce excessive suction, especially on bricks and porous stone. Old bricks often require more water than new ones. On many occasions this is done the day before, if necessary several times with the last damping just before application starts. Apply water starting at the top of the structure. Over saturation of the background will result in loss of bond. Never render backgrounds that have standing water on the surface. Always dampen preceding coats before applying next coat.

It should be noted that in the presence of diferent suction levels the degree of dampening will vary accordingly.

GENERAL GUIDELINES

NHL Renders

Keying: provide adequate keying between background and base coat and between each coat. Crisscross patterns are preferred to combing. Make sure that keying does not cut too deeply. Sometimes joints in brickwork are raked back (normally 10mm), this is not necessary with NHL renders if a stipple coat is applied cast on, harled or sprayed on.

Two coat work

Two coat work is suitable for renders with an overall thickness of approx. 15 mm. on surfaces that provide adequate suction and a good key. On surfaces offering poor suction and keying, it is recommended to use a stipple coat (3-4mm thick) applied by casting on, harling or spraying. The main coat can be applied after sufficient hardening and finished as required. Alternatively use 3 coat work by applying a finishing coat.
On two coat work the base coat will be the thickest (up to 10mm, more if applied in 2 passes) and with a binder: sand ratio of 1:1.5 or 1:2. Use mainly NHL 5 or NHL 3.5.
This can be laid on or preferably cast/sprayed on. Scour back and key after initial setting.
To ensure a flat and uniform surface see "Ensuring a level surface" under Undercoat in 3 coat work section.

Curing: check for initial shrinkage. If found, dampen surface lightly with water and tighten back and re-key. Repeated shrinkage is usually a function of poor quality sands, poor suction control or rapid drying.

Finishing coat: use *NHL 3.5* or *NHL 2* (see individual product sheets)

5mm max. for smooth or light textured finishes, 7-8mm for coarse finishes (tyrolean, roughcast etc…).

Smooth and light textured finishes: use finer well graded sands, 1-2mm down to 0.075mm. Add just enough water to obtain required workability. The more water is added the higher the risk of shrinkage. When the mortar is firm enough, proceed to float up with a cross-grained wood float. This is the most important phase of the finishing work and should be done diligently. Together with good curing and protection it is vital in obtaining a good finish.

Coarse finishes: use coarser sands if thick (rustic) granular finishes are required. The thickness of the coat depends on the final finish required. Some of these finishes, especially the ones requiring special skills such as cottage, scraped and travertine effects, could also be done by using the same type of sand as smooth and light textured (floated) finishes. In these and tooled renderings (patterned), if initial shrinkage takes place, lightly dampen the surface and re-float the area during the first day or two. Tooling is normally applied when the render is 5-7 days old.

Two coat work (contd.)

Dry dashing: throw the chosen aggregate onto soft mortar and leave exposed. To speed up the work a plasterer throwing the aggregate can follow the laying on plasterer.

Curing: curing by water mist over 3 to 4 days, if necessary more than once a day, is essential when weather conditions would cause quick drying. Always protect the work from adverse weather conditions.

Three coat work

Background preparation, sands, suction control, keying and dubbing out: as previously described.

First coat: has to provide sufficient bonding. Stipple or spatterdash can be used on all backgrounds, but especially on impervious and smooth background. Leave these coats rough to provide a key. Use richer mix (1:1.5 preferably). The normal thickness is between 3 and 5 mm. On soft or weak background use 1:2 or 2:5. Successive coats must be weaker than this coat. The thickness of the first coat depends on the nature of the background and the overall thickness required of the render.

A laid on scratch coat can be used on old bricks or surfaces providing a good key (greater care is required in application to ensure good bonding with the background). It will be scoured back with a cross grained wood float and keyed (crisscross keying pattern preferred) once initial stiffening has taken place.

Second coat (straightening): to be applied 2 days (or more, depending on weather conditions) after completion of first coat. Its strength should be less than the first coat. Thickness will vary according to the overall thickness required but it is normally between 10 and 15 mm. It must not be over 20 mm thick. If this is required it should be done in successive coats each not exceeding 20 mm. The thicker the intermediate coats, the longer the waiting time before each subsequent application.

Ensuring a level surface: to achieve a uniform and level surface fix vertical timber battens or dab's on the wall at 2-2.5 m. interval. If the wall is uneven use spacers and check that battens are straight with a plumb level. Fill out to screeds, if necessary in layers. Screed off excess mortar between battens with a wooden straightedge spanning between the battens. When battens are taken down, fill in strips with the same mortar.

An alternative is to make running screeds 100mm. wide at regular intervals.
Scour back and key as usual after initial setting. Check for shrinkage during the first 2 days and, if necessary, lightly dampen the relevant area, tighten back and re-key. In case of intermediate coats this would apply to each coat. Do not apply finishing coat until undercoat is adequately hardened.

Three coat work (contd.)

Finishing coat and curing: as per 2 coat work.

Protecting NHL mortars and renders
The setting properties of NHL mortars require protection against adverse weather conditions. Precautions are necessary and, if in doubt, your St. Astier Distributor will be able to advise further. The following are the main recommendations:

Mortars made with	Protect from frost, rain, strong wind or direct sun for minimum
NHL 5	48 hours
NHL 3.5	72 hours
NHL 2	96 hours

Early exposure to rain will cause some moisture absorption in the first few millimeters of a fresh render. If frost occurs, there might be damage. The figures given above refer, therefore, to a render that has not been subject to water penetration in its early life.

The preferred form of protection is hessian covers that, with re-damping, will also contribute to curing the mortar. Hessian covers are essential to protect against frost. Plastic sheeting is effective against rain but should be kept clear of fresh work. If too tight it will generate condensation leading to unsightly staining. It will not protect against frost. Frost protection should be provided even if frost is not occurring at the moment of finishing the day's work but is forecast during the early days of a mortar. Work should not start in frost conditions or when frost is forecast or with temperatures below 5°C. In working with NHL 2 or in rendering with fine finishing coats, this should be 8°C. Protection from the quick drying effects of wind or direct strong sun should be provided by using shading sheets on scaffolding.

Good working practices

In this document we have already discussed items such as background preparation, suction control, detailing, keying, protection and curing. A good and durable result depends mainly on these factors, the correct mortar mix, sand, dosages and workmanship. One item not to be overlooked is scaffolding. Where scaffolding is being used make sure that the scaffolding has adequate clearance from the face of the wall to allow application, avoiding unsightly lift lines. Scaffolding should project past all areas to be rendered to allow for protection of the new work against direct rainfall. Generally scaffolding should be capable of carrying the protective screens necessary to shade the work and prevent rapid uncontrolled drying and any covers needed to protect against frost.

reader with helpful information that may assist in determining the correct choice of materials, methods of application and determine the best working practice. The guidelines refer to our experience with St. Astier NHL binders and some recommendations might not be applicable to other products.

GENERAL GUIDELINES

NHL Renders

Renders Diagnostics

Defect	*Causes*	*Remedies*
Shrinkage & Cracking greater than 2mm	General or partial movement of the background or the building.	Check if movement is still active. (Engineer to check). If building stable, repair cracks / areas.
Less than 2mm	Thermal movement.Poor workmanship. Render too thick. Too much water in mix. Over saturated backgrounds. Insufficient setting between coats.	Depending on extent, open out crack and fill with same mortar.
Hairline cracks	Bad preparation of background.Over saturated background.Too much binder.Too many fines in sand.Finishing coat to thick.Too much water in the mix.Rapid drying / lack of protection. Too much sun or wind during curing.	Either apply slurry fill if sound or remove and replace properly.
Loss of Bond	Poor background preparation. Poor suction control. Over saturated background. Background too smooth. Incompatibility with existing background. Insufficient strength in bonding coat. Background movement. Metal corrosion.Salt crystallisation. Excessive or late towelling.	Repair or replace as appropriate.Consolidation by grouting may be considered.
Bulging	Poor background preparation.Incompatibility with existing background.Metal corrosion. Frost damage during curing.	Depending on the extent of damage, either partial repair or total replacement. Neutralise and treat any rusting metal.
Powdering / Friability	De-calcification of render (loss of binder). Poor background preparation. Poor suction control. Rapid evaporation of water during application, (pror to adequate set). Frost damage. Insufficient binder dosage. Variation in surface compaction / finishing. Poor sands.	Partial or total repair with correct mortar applying due protection and following best practice.
Water penetration.	Poor background preparation. Weak mortars. Bad detailing.	Partial repair. Light repairs with several coats of lime

		wash.Rectify detailing problems. Replace if necessary.

GENERAL GUIDELINES

NHL Renders

Some reccommended mixes

Background Prepare background Re-point and dub out as necessary with compatible mortar.	**Stipple Coat Cast or sprayed on only** Must be used on poor suction, dense / smooth surfaces. Leave as Cast Cure 2-4 days	**First Coat** Cast, spray or lay on. Well-keyed background. Control suction. Leave Keyed Cure 4-7 days	**Second Coat** Cast, spray or lay on. Control suction. Straightening coat. Leave keyed. Cure 7-10 days. Finishing coat in 2 coats work.	**Finish** Cast, spray or lay on.Control suctionFinish as required Cure min 3-10 days
Cob / Earth	Mix 1A - Sand SG3-5mm	Mix 1B - Sand SG10-15mm	Mix 1C - Sand SG5-10mm	Mix 1C - Sand SF / FS3-5mm
Wooden Lath		Mix 2B/3B - Sand SC12-15mm (8-10 cover)	Mix 2C - Sand SC8-10mm	Mix 1C - Sand SF3-5mmMix 2C - Sand SM5-8mm
Metal Lath		Mix 3B - Sand SC10-15mm (8-10 cover)	Mix 2B - Sand SM10-20mm	Mix 1C - Sand SF3-5mmMix 2C - Sand SM5-8mm
Soft Brick / StonePorous Blocks		Mix 1B - Sand SC10-15mmMix 2B - Sand SC10-15mm	Mix 1B/C - Sand SC/SM10-12mmMix 2B/C - Sand SC/SM10-12mm	Mix 1C - Sand SF3-5mmMix 2C - Sand SM5-8mm
Medium Brick / Stone / Blocks	Mix 2A/3B - Sand SG*3-5mm	Mix 2B/3C - Sand SC10-20mmMix 2B/3B - Sand SG**10-15mm	Mix 2C/3D Sand SC/SM8-12mmMix 2C/3C Sand SG**6-10mm	Mix 1C - Sand SF3-5mmMix 2C - Sand SM5-8mm
Dense Brick / Stone/ Blocks/ Concrete	Mix 2A/3A -Sand SG3-5mm	Mix 2B/3C - Sand SC10-20mmMix 2B/3B - Sand SG**10-15mm	Mix 2C/3D Sand SC/SM8-12mmMix 2C/3C Sand SG**6-10mm	Mix 1C - Sand SF3-5mmMix 2C - Sand SM5-8mm

NHL binder : sand mixes (by volume)

Lime	**Mix A 1:1.5**	**Mix B 1:2**	**Mix C 1:2.5**	**Mix D 1:3**	**Mix E 1:4**
NHL 2	**1A**	**1B**	**1C**	**1D**	**1E**
NHL 3.5	**2A**	**2B**	**2C**	**2D**	**2E**
NHL5	**3A**	**3B**	**3C**	**3D**	

Sands	***Type***	***Particle sizes***
SG	Sharp gritty	5mm down to 0.075
SC	Sharp coarse	3.35mm down to 0.075
SM	Sharp medium	2.36mm down to 0.075
SF	Sharp fine	1.18mm down to 0.075
FS	Fine soft	0.8mm down to 0.075

* Stipple coat optional, depending on background suction and conditions.
** For harling applications.

Note: a wide variety of finishes can be achieved by adopting different binder and sand mixes to satisfy all requirements.

Coat thickness and optional mix ratios are related to exposure and background conditions and are the responsibility of the designer.

Curing and protection must follow best working practice.

This document is a guide only and is not intended to be a specification. Its purpose is to provide the reader with helpful information that may assist in determining the correct choice of materials, methods of application and the best working practice. The guidelines refer to our experience with St. Astier NHL binders and some recommendations might not be applicable to other products.