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To: All Authorized Persons,
Registered Structural Engineers and
Registered General Building Contractors

Dear Sirs/Madam,

Guidelines on Building External Finishes

The Buildings Department is concerned with the several incidents of the falling off of external finishes, such as chunks of tiles and rendering from the external walls of buildings. This undoubtedly imposes great safety hazard to the general public.

It is noted that building external finishes not only fell off from older buildings, but also from some newly completed buildings just a couple of years after issue of occupation permit. This kind of problem is attributed to the improper installation of the external finishes to the concrete substrate and lack of supervision on site.

In order to improve the standard and quality of such works, the Buildings Department now issues a set of guidelines for "Building External Finishes – Tiles and Rendering" for your immediate reference (see attached).

The guidelines shall form the basis of good practices for such works, and when adequate experience has been gained, this set of guidelines with any other refinement will be issued in the form of a practice note.

It is hoped that you will make good reference of the guidelines to ensure the safety and standard of the building external finishes of your current and future building projects.

Yours sincerely,

(K K CHOY)

Assistant Director / New Buildings Division 2
for Building Authority

Encl.

Guidelines on Building External Finishes – Tiles and Rendering

1. Introduction

Ceramic or mosaic tiles with cement-sand rendering are building external finishes commonly used in Hong Kong. They are adhered/bonded to the external walls of buildings by bonding agents such as cement (with or without lime) and sand mortar or a bed of proprietary adhesives. If these building external finishes are inadequately bonded to their parent structure or do not have sufficient movement joints, they are likely to have detachment problems and would pose a serious safety hazard to the public. Therefore, Authorized Persons (APs), Registered Structural Engineers (RSEs) should provide suitable design and specification for the construction of external finishes in the interest of public safety, and Registered General Building Contractors (RGBC) should ensure that tiles and rendering are properly affixed to a building structure.

2. Design and Construction

Particular attention should be paid to the following aspects in the design and construction of Building External Finishes:

(a) Substrate to receive tiling & rendering

The substrate must be rigid and sound. For concrete surfaces, the weakness of substrate is often due to the presence of honeycombs or loose particles not properly remedied prior to the application of rendering. Substrate with dirt, grease etc which is not properly cleaned up also impairs adhesion with the rendering.

Whatever the type of tiling or rendering to be applied, good physical adhesion of rendering to the substrate is only achieved if the substrate is rigid, free from dirt, oil, grease, loose particles, dust, paint and efflorescence.

Furthermore, particular attention shall be paid to the undulating surface where the thickness of the rendering is likely to be uneven. This can give rise to variable stresses and cause debonding.

(b) Mechanical Key

Effective mechanical key should be provided to prevent the rendering material from sagging or sliding during application, so that it may properly bond the rendering to the substrate. Mechanical key to concrete surface is usually achieved by spatterdash.

Any inadequacy of mechanical key on substrate surface decreases its bonding with rendering. This could happen if spatterdash is not applied early enough (while the concrete substrate is still 'green') or not applied in a uniform manner. Therefore, the use of bonding admixtures in spatterdash and/or applying bond coat to concrete surface prior to rendering are also recommended if spatterdash is not applied within 24 hours after removal of formwork from the concrete substrate, or the concrete surface does not provide the required base key.

Other forms of mechanical keys such as mechanical scratching and bush hammering to concrete substrate surface could also be considered as alternative means for providing surface scrubbing other than application of spatterdash and bonding agent.

The rendering should not have total thickness in excess of 20mm. Each coat of rendering should not be less than 8mm thick, nor greater than 16mm thick. On dimensionally accurate substrate surface one coat of rendering is usually sufficient but to obtain a true rendering surface on an uneven substrate surface of greater thickness, a total proprietary adhesion system with additive in the rendering and incorporation of suitable expanded metal lathing anchored to the substrate should be considered. The use of metal lathing anchored to the concrete structure is recommended if the thickness of the rendering exceeds the specified tolerance.

It must be emphasised that the use of bonding agent in place of proper keys would not yield the same result of bonding. The application of wet rendering to a thin coat of bonding agent is simply not the solution if spatterdashing immediately after striking off of formworks and mechanical keys are not provided.

(c) Expansion Joints and Tile Pointing

Adequate expansion joints to the full depth of the rendered substrate should be allowed for the tiling work in accordance with the recommendation and technical data of the tiles from the tile supplier. The expansion joint should be sealed with suitable and appropriate sealants on joint filler.

Expansion joints should also be provided to the rendering where it abuts restraining surfaces, or over cold joints, control joints and expansion joints in the substrate structure. The full depth of expansion joint should be filled with approved joint filler prior to application of joint sealant.

Other typical joints between the tiles should be formed with uniform width as specified and should be pointed with suitable grouting materials so that rainwater, which carries dirt and other pollutants, could not easily penetrate through the joints leading to the debonding of tiles from the rendering or the rendering from the substrate surface. This debonding action would be aggravated when cracks are present in the rendering which are not easily visible from surface.

Expansion joints down to the substrate surface as required should not be omitted and should be formed at the time of rendering, **not** afterwards by other means such as saw-cut.

(d) Materials

The materials shall be compatible, and handled properly. They shall not be contaminated. Substandard and overdue materials shall be discarded, and not be used.

3. Relevant standards on External Rendering and Tiling Works

The standards for building external finishes works listed below are intended to provide reference and information and are not exhaustive.

Standard	Description
BS 5980 : 1980	Specification for Adhesives for use with ceramic tiles and mosaics
BS 5262 : 1991	Code of Practice for External renderings
BS 5385 : Part 2 : 1991	Wall and floor tiling Code of Practice for the design and installation of external ceramic wall tiling and mosaics (including terra cotta and faience tiles)
BS 8000 : Part 10 :1995	Workmanship on building sites Code of Practice for plastering and rendering

4. Supervision and Quality Assurance

RGBCs are reminded of their duties to provide qualified / experienced personnel on site to supervise the carrying out of the external rendering and tiling works throughout the process of surface preparation, provision for effective mechanical keys and expansion joints and the application of external finishes. Proper recording of such supervision of the RGBC should be encouraged. AP / RSEs are also reminded to pay attention and carry out audit check on the supervision of the RGBC.

If considered necessary, the AP / RSE should specify appropriate test methods, such as hammer tapping or insitu pull-out tests, to ensure that the external finishes have been applied properly to achieve adequate adhesion to the building structure upon completion.