Technical Bulletin 技術佈告欄

TB130 Sources of Grout Dis-coloration Real and Perceived

TB130 填縫劑產生色差的原因

INTRODUCTION & SCOPE

One of the more common issues that can occur with cementitious tile grouts is dis-coloration of the finished grout. There can be a number of causes of this phenomena and this bulletin will look at the issues involved.

對於水泥基填縫劑施工後產生色差的各種原因, 本文將試著予以解釋

COLOUR DOES NOT SEEM TO MATCH SAMPLES

NATURAL MATERIALS

The grouts are made from materials including cement and coloured oxides. These are based on natural substances and there can be a degree of variation in both the raw feed stocks and hence finished product. This can lead to slight variations in the colour of the grout itself.

填縫劑現場施工後與原樣板不太一致

天然物質

填縫劑主要組成為水泥及氧化鐵顏料, 這些材料來源大部份來自于天然礦產, 或多或少會有些顏色上的差異進而導致產成品顏色上的些許不同

VISUAL PERCEPTIONS

In some cases there is a visual illusion where the colour of the grout does not to seem to be right when adjacent to the tile. For examples ARDEX FLEXGROUT comes in two shades of white, Polar White and Ultrawhite. Though both look white, in fact Polar White is slightly blue-grey and this may not become apparent till put up against a white tile. It is a good idea to try and compare the tiles and grout at the time of purchase.

視覺上的偏差

當填縫劑施做後緊鄰著瓷磚會看起來與單獨存在時的顏色有著些微差異, 譬如說同樣的填縫劑有三種不同程度的白度, 看起來都是白色, 但實際上亮白色填縫劑有些微的灰藍色澤, 不放在白色瓷磚上作對比是難以察覺, 選樣時最好是將瓷磚與填縫劑放在一塊進行選擇

SAMPLE SWATCHES

The printed colour swatches on the grout packaging are for information only and are restricted by the printing process and may vary from the mixed colour. The powder grout in the bag is usually a pale colour which is predominantly due to the cement. The mixed colour is darker and different in tone, so the powder should not be used as an indication.

實體樣品及色卡印刷與實際的差異

請記住印刷品的顏色僅供參考, 其目地在於便於與客戶溝通, 而填縫劑實體乾粉(因為含水泥看起來光澤度較暗些)也不能作為最終選色的依據

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SHELF LIFE

When grouts have exceeded their recommended shelf lives, the changes in the cement component due to ageing can result in unpredictable colour effects. Some colourants may also alter with time. Grout passed its shelf life shall not be used for this reason, as well as possible problems with cement curing.

產品儲存期

超過儲存期的填縫劑顏色難以控制, 填縫劑中水泥, 色料等原料都可能發生質變導致顏色差異, 過期產品不應再予使用另外的原因是水泥過期將影響其乾燥及固化

NON UNIFORM JOINT DEPTH

Where the grout depth varies the shade of the grout can be irregular due to differential drying rates and shadows. When installing, keep the grout levels consistent, and rake out old grouts fully to ensure a constant thickness.

填縫深度不一

縫深深度不同時導致填縫劑乾燥速度不同形成陰影, 磚粘貼施工時採硬底施工如此縫深容易形成一致可避免此情況產生

UNEVEN TILE GLAZE ON EDGES

This can result in variations in colour due to differences in moisture absorption by the tile. This can be limited by misting the edges of the tiles with a fine water spray prior to grouting.

釉面磚邊緣上釉不均

磚邊緣多半是不上釉的, 但在製作過程難免造成上釉不均的情況如此會造成磚邊吸水率不同進而造成填縫劑乾固後的顏色差異, 填縫施工時, 可先以清水噴霧稍加浸濕磚縫的方式來避免

INSTALLATION & SITE MOISTURE ISSUES

The grout application can have a bearing on the final colour due to both practice and site conditions.

現場施工及濕氣問題

同一瓷磚填縫劑在不同環境下,不同時間及不同操作方法時會產生一定的外觀差異

OVER-WATERING

The grout is designed to be mixed with a certain ratio of water to form a soft paste of roughly creamy consistency that holds its shape like toothpaste. Where the installers has added too much water this can alter the colour due to both alterations in the cement properties and also separation of the colouring oxides from the mix. Also, the excess water takes longer to dissipate from the grout leading to apparent darkness however, the resultant grout can be paler than expected, and also streaky or blotchy in appearance. There is no simple remedy to this problem other than re-installation.

過量加水攪拌

水泥基填縫劑操作時都有其一定的水灰比, 操作時加水過量進行攪拌將造成最終顏色的差異, 原因為水泥反應行為會有所不同, 更可能造成著色氧化物在攪拌時的分離, 過多的拌合水將導致填縫劑中水份需要較長的時間消失, 初期看起來會顏色較深, 但最終顏色會較正常稍微偏白且有斑點的出現, 當此情況發生後, 解決方式除了重做別無他法

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POOR MIXING

If the grouts are badly mixed, then the colours can be variable because the colourants are not properly dispersed through the grout. Ensure grouts are thoroughly mixed before application and mixing should be sufficient to ensure water is absorbed. The grout powder is added to water and mixed to achieve a consistent paste, let stand for 3 minutes, restirred and then applied.

攪拌不確實

倘若攪拌時隨意而為，並無充份拌合後使用，顏色的差異非常容易發生，原因很簡單，填縫劑中的色料無法分散均勻，施工操作時應將填縫劑以粉體入水方式以適當機具充份攪拌至均勻細柔漿體，然後靜置約 3 分鐘待其稍微熟化後，再重新攪拌後使用

EFFLORESCENCE

This is a physical condition that occurs where water soluble salts rise to the surface and then when the water evaporates the salts deposit out as a powdery or crystalline crust. These salts mainly come from cement based substrates such as the floor slab, adhesives or grouts, however in areas of high water table and rising damp these salts can come from the ground water and contain chlorides and sulphates.

白華

此狀況為水溶性無機鹽類隨著水份蒸發帶至表層形成粉狀或結晶狀表層堆積，這些無機鹽類多半來自於水泥基底層如地坪，粘結劑或是填縫劑，也可能是來自於某些含氯化物及硫酸鹽的地下水位或上升的濕氣中

With grout efflorescence is typically whitish in colour and results from soluble calcium salts being deposited. It can be blotchy or produce an overall light colouration. Primary efflorescence occurs immediately and secondary occurs at a later date. Dark coloured grouts are more likely to show efflorescence due to colour contrast and *all* cement based materials can show efflorescence.

填縫劑的白華狀況多為白色，來源則為水溶性鈣鹽類的沉澱，反應在顏色上有斑點及整體的色澤變淺，一次白華將立即形成，二次白華將在往後持續發生，在深色的填縫劑中白樺狀況因對比明顯較容易觀察，幾乎所有的水泥基產品都會有或多或少的白華現象

Efflorescence occurs due to several conditions and is made worse by cool temperatures and overall dampness, therefore winter and coastal or very humid environments are more likely to show efflorescence.

白華的成因有很多，在潮濕及低溫狀況下更是容易發生，所以冬季施工或是延海地區及非常潮濕的環境下施工，白華狀況屢見不鮮

Sources

Where the tile installer has used excess water in both mixing the grout and also clean up, soluble salts can be leached from the grout cement (this also applies to the tile adhesive) and then deposits on the grout surface as drying occurs. Cool temperatures at the time of installation both prolong cement curing and also retards water evaporation. This can increase the likelihood of efflorescence.

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來源

施工人員使用過多的水去進行攪拌及擦拭清潔, 水溶性鹽類更容易從填縫劑的水泥中溶解出來然後在乾燥後的填縫表面顯現出來, 低溫環境下施工將延緩水泥固化養護過程及水份的蒸發, 這些都將加大發生白華的機率

Where there is ground water, rising damp or damp slab, soluble salts can move with the ground water, or be leached from the slab, tile adhesive or grout and deposit on the grout, since this is the most porous area for evaporation to occur. Efflorescence may also appear on porous tile surfaces and brickwork. Ground water and rising damp are beyond the scope of this bulletin, but should be addressed as they lead to other more serious problems.

當有地下水影響, 潮濕樓板的上升濕氣等, 水溶性鹽類將從地坪, 黏著劑或填縫劑本身中溶解出來並在填縫劑表面形成堆積, 因為填縫劑本身孔隙最多, 有時白華現象也可以在磚或多孔隙陶磚上觀察到, 地板潮濕或持續不斷的濕氣上揚不僅造成白華更將導致其它更為嚴重的問題在此先不予以討論

The tile grout has been applied too soon after the tile adhesive which has not fully dried. The moisture from the tile adhesive then leaches through the grout carrying soluble salts which deposit at the surface. The slab or screed was not dry, or insufficiently cured and then moisture travels up through the grout.

瓷磚填縫作業緊跟著瓷磚粘貼施工, 在黏著劑未完全乾燥, 黏著劑的濕氣將把游離鹽類穿透填縫劑在表面形成白華, 同樣的地坪工程中樓板混凝土或墊層砂漿未完全乾燥就在其上貼磚填縫也會在磚縫上出現白華現象

Solutions

I. Stick to the correct water mixing ratios during installation.

II. Check that the slab or screed is properly cured and dry. Slabs typically take 28 days to cure, though drying is typically 25mm per month of slab thickness. Screeds take around 7 days to cure, and dry around 1mm perday.

III. Check that rising damp is not present.

IV. Try to work at temperatures above 10^{0}C and have adequate ventilation to promote water evaporation.

V. Allow adequate curing times for the tile adhesive.

VI. Where rising damp occurs a subfloor membrane may be required.

解決方法（基本準則）

1. 施工時應按照正確加水比例進行拌合
2. 施工前先檢查底層的乾燥狀況,一般而言混凝土至少 28 天養護,混凝土的乾燥速度以每月 25mm 厚度進行,砂漿墊層至少 7 天養護,乾燥速度僅為每天 1mm 速度進行
3. 檢查有無濕氣上升的潛在危險
4. 儘量在通風良好及 10℃以上的溫度施工
5. 瓷磚黏貼後允許足夠的乾固時間
6. 地下防水不能馬虎草率進行

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Cement derived efflorescence can be washed off by several processes -

I. Where it is light, use of a white nylon bristle brush can loosen the powder enough to be vacuumed up.

II. Where the efflorescence is slight to medium, scrubbing with a white bristle nylon brush and several water washes should progressively remove the deposits. A more aggressive method is to use white vinegar (commonly around ~5% acetic acid) which will neutralise the deposits and dissolve them. Thorough water rinsing is required afterwards.

III. Medium to heavy efflorescence may require more vigorous methods of cleaning. This involves using a dilute solution of hydrochloric acid (<5%) and a stiff white nylon brush. The acid will need to be neutralised afterwards either by household ammonia or 10% Sodium Carbonate solution (10gms washing soda dissolved in 100ml water).This is then followed by water washing to remove the residues.

因水泥產生的白華現象多半可以利用下列方式予以清除

1. 白華輕微時以白色"菜瓜布"擦刷並吸除
2. 白華中等程度時以白色"菜瓜布"刮擦並配合以清水反覆沖洗
   另一比較激進的方式是以不帶色食用醋 (約 5% 乙酸,醋酸) 進行清洗並將其中和溶解,然後再以清水沖洗乾淨
3. 白華情況非常嚴重時可能得以 < 5% 濃度以下的鹽酸搭配硬質"菜瓜布"進行刷洗再以家用氨水進行中和, 最後同樣需以大量清水清洗殘存物質

WARNING – WHEN USING HYDROCHLORIC ACID, IT IS COMMERCIALLY AVAILABLE IN APPROXIMATELY 32% SOLUTIONS WHICH ARE HIGHLY CORROSIVE AND ALSO RELEASES IRRITATING ACID VAPOURS. (MAY ALSO BE CALLED MURIATIC ACID).

NEVER ADD WATER TO ACID WHEN DILUTING THE ACID. ALWAYS ADD ACID TO WATER WITH STIRRING.

警告–

一般市售鹽酸約在 32%濃度比例 具腐蝕性, 同時釋放刺鼻酸性氣體

使用時應先閱讀相關操作說明, 操作時務必穿戴護目鏡, 手套, 口罩等專業用護具

稀釋時絕對禁止將水加入鹽酸中, 應將鹽酸緩慢加入盛有水的容器中並予以慢速攪拌

DISCOLOURING UNDER SEALERS

Where a sealer has been applied too soon after the grout has been installed, the moisture from the grout, and probably the adhesive can rise to the surface under the sealer and produce colour variations and patchiness. The grout and adhesive must be allowed to cure for at least 14 days before sealers are applied.

填縫作業剛完成未全乾燥情況下就進行浸封劑的施作也將導致濕氣無法正常揮散進而造成色澤上的差異甚至出現塊狀濕斑, 黏著劑與填縫劑作業後至少 14 天, 方可進行浸封塗布

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COLOUR LEACHING IN POOLS

Where a coloured grout has been used in a pool or chlorinated pond, the chlorine acts as a strong oxidiser or bleaching agent and will over time fade the grout colour. Therefore Ardex does not recommend the use of coloured grouts other than whites in these situations.

Note: Bromine compounds used in spas are even more aggressive than chlorine chemicals.

泳池中所用的彩色填縫劑, 因遭漂白水不斷侵蝕顏色將逐漸變淡, 所以亞德士在泳池填縫上一般祇建議使用白色, 溫泉池中各式礦物質對顏色的侵蝕可能比氯更加嚴重也祇建議使用白色填縫劑

MOULD GROWTH

Black mould can grow on the grout surface where the installation is dirty, the area is dark and ventilation poor. The simplest solution is to clean the surfaces regularly, and have adequate air movement to allow moisture to disperse.

黴菌及青苔滋生

發黴可能產生, 如操作時用水髒汙, 使用場所在陰暗面加上通風狀況不良

最簡單的解決辦法是, 經常性的清潔填縫表面, 保持良好的通風狀況或直接選用反應型樹脂填縫劑(Resin Grout)

CLEANING

Cement based grouts are porous even when they contain additives such as grout booster. As a result they can discolour over time with cleaning, and this is particularly noticeable where the grout is a light colour.

Use of excessively concentrated acid when cleaning will cause severe dis-colouration and decomposition of the grout.

清潔

即使是添加了乳膠的水泥基填縫劑表面還是具有高孔隙率, 經久的清洗或多或少定會有色差的產生, 若以弱酸清洗的表面不但會造成色差還將一定程度的腐蝕填縫劑表面

IMPORTANT

This Technical Bulletin provides guideline information only and is not intended to be interpreted as a general specification for the application/installation of the products described. Since each project potentially differs in exposure/condition specific recommendations may vary from the information contained herein. For recommendations for specific applications/installations contact your nearest Ardex Australia Ofiice.

DISCLAIMER

The information presented in this Technical Bulletin is to the best of our knowledge true and accurate. No warranty is implied or given as to its completeness or accuracy in describing the performance or suitability of a product for a particular application. Users are asked to check that the literature in their possession is the latest issue.

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