



Technical Bulletin 技術佈告欄

TB-131 Common Practices When Installing Floor –Smoothing Cement That Result In Problems

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主題：常見的自流平錯誤施工習慣-導致失敗

There is an old saying, 'that a poor workman blames his tools' when something goes wrong on a job. In the same way, problems in a flooring installation seem to be sheeted home to the products in the first instance, rather than looking at the installation practices.

In the 30+ year long history of Ardex flooring products in Australia, experience and investigation of customer complaints has shown that the most common cause of problems results from poor installation procedures. This occurs either through unfamiliarity with the application and product properties, or via ingrained procedures which go against the recommendations of Ardex, flooring manufacturers or the Australian Standard.

Installers always need to keep in mind that the cost of a rectification is roughly three times the initial job cost, and that the profit from the next 30 or so jobs may be consumed in making good this one job. In this bulletin we will look at some of the practices which are most likely to produce complaints.

西方人有種說法” 手藝差的師傅通常怪罪於他所使用的工具”，地坪施工出了差錯，十之八九也是這樣的直接反應”材料不行”是普遍的理解，大多數的人不會花時間去研究真正的原因及其在施工過程中所犯的錯誤。

亞德士在澳洲積累了30多年在地坪施工失敗後的調查經驗，發現多數情況為使用者對所使用的產品的不熟悉，施工時自以為是的操作及違反生產廠家建議的操作程式忽略對施工基面基本要求所導致

施工承商千萬得知道當工程失敗後的修繕或返工費用將高達約原工程造價的三倍左右無論多高的利潤也無法彌補返工所造成的損失，在接下來的報告中我們將逐一敘述常見的錯誤作業習慣

WHAT ARE THESE PRACTICES?

Basically there are four installation areas where issues can arise due to problems with poor working practices, or omission of preparative steps -

- Moisture in the subfloor
- Preparation of the subfloor including priming
- Mixing and application of the product
- Using the wrong product

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常犯的錯誤有那些?

基本上施工誤差屬下列四類問題最常見, 施工中的錯誤或草率不到位甚至省略

1. 基層所含的濕氣 ,
2. 基層澆置前的準備包括底塗劑的操作,
3. 攪拌作業及施工整平
4. 材料的選用錯誤

MOISTURE IN THE SUBFLOOR

This is an area where there is a temptation to say 'she'll be right' and go ahead with the job, even though no measurements or checks have been done. The subfloor moisture can come from either young uncured and damp concrete, or damp slab syndrome resulting from ground water or rising damp. Moisture can be trapped under sheet vinyl and cause blistering, or odours and smells in carpets.

The results of ignoring damp can be truly financially catastrophic for the installers. For example, having a vinyl installation bubble, blister or de-bond in a large supermarket, or health care facility will result in lengthy disruption and large demurrage charges for lost income.

The corrective actions are straightforward –

- ✓ Is the slab young age, remembering that concrete dries around 25mm a month? If so, damp is likely to be a problem. Let the slab dry naturally where possible.
- ✓ Has an exposed slab been rained on the last few days.

基底濕氣

遇上這類麻煩的時後, 多半會覺得沒啥大不了, 先做了再說甚至連量測濕度的動作都省略. 地坪基底的濕氣多半來自於未完全養生的混凝土版或是更糟的情況-結構體下方的地下水經由毛細管傳導至基面. 當卷材塑膠地板安裝完成後濕氣蓄集於面材下方導致脫膠起凸, 或地毯鋪設一段時間後產生令人不悅的異味
輕忽濕氣將可能導致施工承商災難性的賠償責任, 返工費用, 工期延誤費用等

正確的做法應該是-

- ✓ 基底混凝土樓版是否養護完整? 請記得一般混凝土乾燥的速度約在每個月 25mm 厚度, 若基底未完全乾燥應該讓它自然乾燥完全
- ✓ 施工前幾天內曝露在外的樓版是否遭雨淋

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- ✓ Ask is the slab below grade and look for signs of dampness during the inspection.
- ✓ Measure the subfloor moisture contents. The Australian Standard AS1884 specifies <5.5% moisture content or <70% relative humidity.
- ✓ Install an appropriate moisture barrier and protective topping where moisture is a problem.
- ✓ Do not skimp on the membrane thickness, two coats of ARDEX MOISTURE BARRIER to a thickness of 0.3mm are required.
- ✗ Do not lay flooring directly onto the membrane.
- ✓ Refer to Ardex Technical Bulletins TB006, TB040 and TB081 for specific information.
- ✓ 倘若基底是位於地表以下得仔細檢查有無滲水或反潮現象
- ✓ 量測基底的濕度含量,按澳大利亞 AS1884 標準 濕度含量應小於 5.5%或相對濕度小於 70%
- ✓ 在有濕氣威脅且無可避免的情況下應加做防潮層以阻擋上升濕氣
- ✓ 以 ARDEX MOISTURE BARRIER (WPM300) 亞德士 WPM300 做為防潮層處理基面時 施工厚度兩塗層必需達到指定幹膜厚度 0.3mm
- ✗ 千萬別直接在防潮膜的上方直接覆蓋面飾材
- ✓ 另外請參考 TB006 , TB040 及 TB081 等技術佈告檔

SUBFLOOR PREPARATION

Remember, when the installer starts the job they have accepted the condition of the subfloor and are responsible for whatever happens from there on with flooring installation. This is written into the Australian Standard.

The major sources of problems with flooring installations derive from poor subfloor preparation. Ardex always recommends that the subfloor is correctly prepared prior to any product (flooring, tiling or waterproofing) being installed. The contaminants include old adhesives, paints, oil-grease, dust and dirt, cement laitance, rain damaged surfaces, weak screeds, curing compounds and sealers. Advice that products can safely go over contaminants should be considered dubious at best and the old maxim 'when in doubt don't' is good sense. Steel trowelled, highly dense non-porous and polished concrete also provide adhesion problems.

Failure to do this elementary first step in a flooring job is inviting a problem, though we in Technical Services are regularly told that preparation is too dirty and will make mess, there is no time to do the preparation, or it is too expensive and the customer won't pay for it. Another common request is, "can we prime over the subfloor contaminants?" This is another poor practice that cannot be recommended, since the bond for the primer/topping then relies on the contaminants sticking to the subfloor.

An all-too-frequent end result of failing to perform adequate preparation is de-bonding of the topping and covering from the subfloor. It is easy for Ardex when conducting a forensic analysis of the problem, to identify this malpractice since the contaminants are usually stuck to the back of the topping.

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基層準備

依據澳洲施工規範當施工方開始作業時就表示施工方已接受基底的一切狀況將對施工的成敗付完全的責任。

地坪施工失敗的最主要原因來自於基層準備的問題, 亞德士一再強調正確完成基底準備的重要性, 無論是防水工程, 瓷磚粘貼工程或是地坪工程都是一樣的重要, 地板上的污染包括舊有殘存的地板膠, 漆料, 油污, 灰塵, 浮漿, 膩子等甚至遭雨沖刷的地面, 鬆散的砂漿, 養護劑, 浸封劑等, 倘若有人說”沒事”千萬別信,”若有疑問, 持否定態度總是較為保險, 還有經過細鏟整或機械鏟整的緻密吸水率低的地面對自流平的接著都將起到不良的影響, 對基層準備的馬虎態度將導致麻煩的開始, 技術部門常聽到的解釋多為”太麻煩啦” 髒啦 “沒時間了” 或”業主沒這預算” 等解釋, 甚至會有人問”可不可以直接再基層表面上的各種污染物上直接上底塗等?” 試想想所有的接著將依賴原先不良的基層會有什麼好結果

常見的基層準備誤失像是與基底接著不良所導致的空鼓脫膠等, 祇要查看脫膠的自流平底部到底沾黏起什麼就一目了然

The corrective actions are based on sound techniques –

- ✓ Prepare concrete or timber by mechanical means to a sound surface with adequate surface profile, removing all contaminants, old adhesives and weak layers.
- ✓ Always vacuum the surface clean after mechanical preparation processes.
- ✓ Ardex Technical Services has produced Technical Bulletins which give instructions on the types of preparation that are required and what happens when it is not done. Refer to TB037, TB039 and TB041.

The following case histories give examples of poor practices that have resulted in field failures. In all these examples a customer complaint was received and Ardex Technical Services conducted an investigation in conjunction with the sales

representative. In each example shown, examination of the site and samples traced the source of the problem back to an aspect of the subfloor preparation.

正確的動作應根據實在的實戰技術基礎

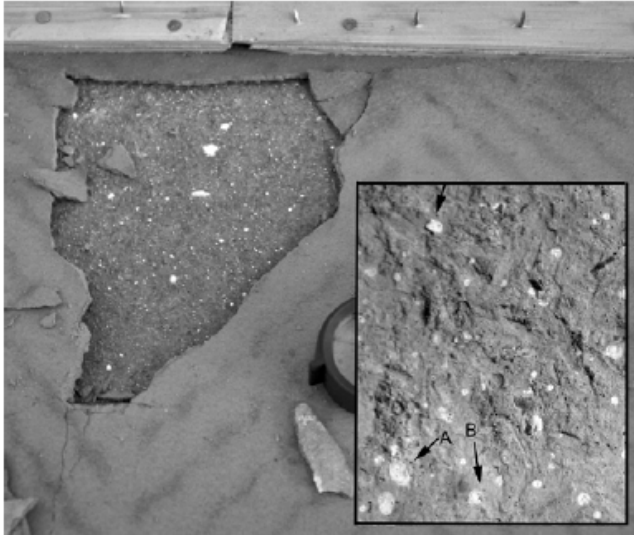
- ✓ 基底不論是混凝土或木板都必需以機械方式處理至堅實基層及足夠的粗糙程度, 去除所有表面污染物包括先前殘留的地板膠及鬆散的表面浮漿
- ✓ 機械處理完成後一定以工業吸塵器徹底清潔地面
- ✓ 亞德士技術部另針對不同基層狀況的處理建議及可能延伸的後果請參考技術公告 TB037, TB039 及 TB041

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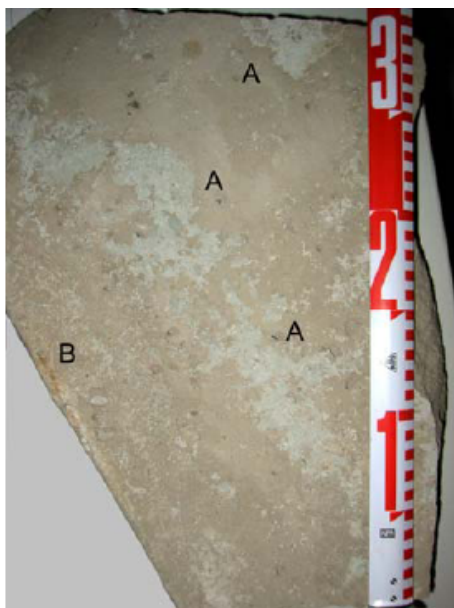
下列實際案例供各位參考, 並引以為誡



The floor shown on the left was particle board timber which was not sanded to remove the waterproof coating and building contaminants including plaster residues. This floor had also been rain affected and had a weak surface layer.

The topping was ARDITEX which de-bonded the weak top layer.

基層為木質壓密板, 表面未經打磨去除壓密板表面防水層, 另外壓密板表面還殘存污染物-膩子, 另外基層表遭雨淋出現鬆散狀況, 所使用的自流平為 ARDEITEX, 使用後出現”脫膠”現象



An example of contaminants on the back face of de-bonded ARDEX 45.

A – Weak concrete subfloor material such as laitance.

B – Clay dirt from foot traffic.

使用快乾 A45 砂漿後產生脫膠, 檢查粘結面發現原先基層上的污染物及泥巴

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Ceramic tiles which were covered with ARDEX K15. The glaze and other residues were not fully removed prior to the application of the levelling cement was partially responsible for the Neoprene primer to de-bonding. Also this location had rising damp (white efflorescence on the tile) which further degraded the K15 and loosened the primer bond. Vinyl tiles de-bonded off the floor.

ARDEX K15 使用在舊瓷磚上, 雖然使用的是 Neoprene 底塗劑但由於並未將瓷磚表面的釉及髒汙完全磨除乾淨仍然導致脫膠, 另外還發現此區域有濕氣上升的現象(白色反鹼)更加大導致 K15 及底塗劑的脫膠進而延伸至表面膠地板的膠粘失敗



A concrete floor coated with a curing compound. The floor has been partially ground, but not sufficiently to promote good adhesion.

混凝土地坪表面有養護劑, 雖經打磨但不夠粗糙也不足以提供完全接著

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Vinyl tiles which de-bonded with the skim coat of levelling cement. In this case the swirl patterns shown are from the original concrete surface which was both rain effected, and had not been ground back. The combination of a overly thin layer of K15, high floor loads and weak surface layer resulted in de-bonding.

膠地板與薄層 K15 自流平膠粘失敗，圖中旋渦狀為原混凝土基層遭雨淋後雖經打磨但仍不足，脫膠原因為施工厚度過薄，地面承受高承載及基面鬆散等原因組合導致

PRIMING – FAILING TO DO IT

The Ardex flooring cements are part of a system, and each component has a role to play in that system. There seems to be a range of erroneous perceptions that priming is optional, will cure a multitude of poor preparation sins and any old primer will do the job. Nothing could be further from the truth.

In the Ardex systems primers perform two major tasks;

- They penetrate in the substrate and promote chemical bonding key to surface
- They assist in the correct curing of the cement base of the product by preventing premature water loss through absorption into the substrate.

The primers also close up the pores of the surface (concrete) and prevent trapped air bubbles from migrating through the drying cement and producing ant holing.

Primers are not intended to help bond the topping to contaminants. Yes, the primer normally bonds to the contaminants such as old adhesives, weak layers and dust, but then the whole lot comes off the floor when the contaminant de-bonds. Plastic films of ARDEX P51 primer have to been observed to lift cleanly off a floor in a sheet because the primer has stuck to the cement dust and rubbish not vacuumed off the floor in the first place, and not adhered to the concrete itself. Paint for example does exactly the same thing over dusty dirty surfaces.

Another fairly common question is, “can we use XYZ bonding agent from the hardware”, and the answer is simple – No. Ardex primers are designed to work with Ardex levellers, other manufacturers’ products are not, and the results can be unpredictable and no warranty will apply.

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底塗劑 (打底) - 不確實

千萬別認為自流平施工時打底(上底塗劑)這一動作是選擇性而非必要的,也千萬別認為祇要上了底塗劑,基層準備就可以馬虎了事,亞德士系統中底塗劑起到兩個主要的任務

一是滲入基底並與上層材料形成最佳的化學接著

二是確保水泥基產品良好及足夠的養生條件,避免基底過份吸收產品反應生成所需水份

底塗劑還將基層的毛細孔封阻避免孔隙中空氣透過漿體在自流平表面形成蟻穴狀針孔,底塗劑的使用並不是用來幫助漿體附著在基層各式污染物上,沒錯,多半時後底塗劑可以很好的附著在如灰塵,舊粘結劑或鬆散的混凝土面上但當這些污染物脫膠時自然而然的在其表面的材料也就脫膠分離了,如同漆料一般,有時在現場可觀查到 P51 底塗劑成片的與基底剝離,原因出在底塗劑並不是與基底緊密接著而是隔著一層灰塵或是其它污染物

還有人常問到是否能使用其它廠牌的底塗劑來配合亞德士自流平的施工,答案很簡單,不行,因為我們完全無法掌握其它產品的特性也無從瞭解其在搭配使用上的變化更無法提供相對應的保障



Where priming is not done on porous surfaces ant holing will occur. This is not satisfactory for vinyl flooring.

在孔隙率高(吸水率高)的基底,沒施做底塗劑或是不夠將導致自流平表面產生針孔這對膠地板施工會造成困擾

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Remember: Use the correct Ardex primer for the application that is being attempted and don't be tempted to cheat and go without, or use substitutes.

When using the primers always –

- ✓ Mix the two parts of ARDEX P82 completely and do not make too thick.
- ✓ Use ARDEX P82 over ARDEX MOISTURE BARRIER or properly prepared non porous surfaces such as tiles, timber or metal deck.
- ✓ Use the appropriate dilution ratio for ARDEX P51 for the substrate;
 - Diluted 1:2 with water for porous surface
 - Diluted 1:3 for highly porous surfaces and
 - Diluted 1:1 for less porous surfaces or as a second coat over 1:3 dilutions.
- ✓ Apply thin coats and spread out evenly. Allow to dry for the recommended times. Typically the floor is ready when primer is tack free.
- ✗ Do not lay leveller over pools of P51 or P82 on the subfloor. This can produce areas that are locally over-watered at the subfloor interface or can result in cracking of the topping.
- ✗ Do not apply levellers over wet primer. Again, this can lead to problems with localised over-watering or primer rising through the topping and forming a skin, or even formation of ant holes where the primer rises through the topping and the water in evaporates.



Ardex Neoprene primer is still used in some situations. Neoprene primer must only be used with adequate ventilation, and is best restricted to external applications where there is air movement for the solvent carrier to disperse. When used indoors there must be suitable fan ventilation. Certified spark and flame resistant electrical equipment such as mixers and ventilation fans MUST be used. Neoprene should not be used in enclosed spaces such toilets or lift cars. Failure to observe these rules can result in serious injuries due to possible flash fires. Always request and read the Material Safety Data Sheet when prior to using Neoprene primer.

請記住僅使用正確的亞德士底塗劑，別使用其它替代品或根本不打底，使用底塗劑時請遵循下列準則：

在使用 P82 雙組份合成樹脂底塗劑時，充份攪拌均勻且塗布時以薄塗即可在亞地斯防潮膜上方以 P82 打底接著或是在其它非吸水性基面，經適當處理後(清潔, 糙化) 使用 P82

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P51 使用時依不同基底狀況進行不同比例的稀釋使用

針對吸水性基面以 1:2 稀釋後進行打底

針對高吸水性基面以 1:3 稀釋後進行打底

一般不太吸水性基面以 1:1 稀釋後進行打底或是使用於第二遍打底
(先前已 1:3 打底過)

打底時充份塗布均勻最好以毛刷或尼龍刷推擠底塗劑以求最佳滲透效果
然後給予足夠時間待其乾燥, 一般判斷為底塗劑顏色由乳白轉為透明且不
沾手時即可進行自流平的澆置

別在 P51 或 P82 堆積料中(小池塘) 進行自流平澆置, 可能導致此區域水灰
比的偏差進而產生不均勻收縮開裂

同樣的別在底塗劑還是潮濕時進行自流平澆置, 此行為將導致水灰比偏差
甚至底塗劑蒸發向上後還會造成表面針孔狀”蟻穴”



✘ The floor at left has been primed with ARDEX P51 Primer. There are puddles which need to be dispersed, and the floor allowed to dry before the topping is poured.

✘ Below is a puddle of P82 about to be over coated. This could cause cracking in the leveller.



左圖為以 P51 剛完成打底動作, 可以看到部份凹陷區域產生白色底塗劑材料堆積的狀況必需將其塗散開來及待乾燥後方能進行自流平施工動作

右圖中右下角可明顯看到粉紅色的 P82 底塗劑即將被自流平所覆蓋, 過厚的 P82 底塗劑將導致自流平的開裂

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APPLICATION OF THE LEVELLING CEMENT

When it comes to laying the levelling cement, there are two basic times that procedures can go wrong and these are;

- ⇒ The mixing stage
- ⇒ The laying operation

MIXING STAGE

Gauge Water

Ardex levelling cements are designed to work with specific amounts of added water or water/ARDEX E25 mixes. These water ratios are printed clearly on the relevant product datasheets, packaging and Technical Bulletins for special applications.

In general under-watering has no real negative effects on product performance other than reducing flow properties. However, by contrast over-watering the product by as little as 10-15% produces a raft of problems which can lead to having to re-do the floor.

The problems which can be caused are;

- ✗ Segregation of the particles in the leveller.
- ✗ Slow drying.
- ✗ Excessive shrinkage with resultant cracking and de-bonding.
- ✗ Weak surface layers and reduction in overall underlayment strength.

自流平的施工

施工過程中有兩個步驟可能產生錯誤，一是攪拌 二是澆置攤拖

攪拌過程

正確量取攪拌用水-亞地斯自流平無論是加水拌合或是以 E25 乳膠進行攪拌都有一定的拌合比例規定，一般情況下倘若用水量少於指定用量除了降低其流動度及整平性能外沒有其它的麻煩，但若是加水過量祇要多個 10-15%那就可能導致一連串的麻煩了，很可能你得重來過

加水過量可能會

- 自流平本身材料的分層(粒料分離)
- 乾燥速度變緩
- 收縮量變大, 開裂脫膠都有可能發生
- 強度差, 表面鬆散

技術佈告屬內部指導檔。不能代表所有工地現場實際施工時所發生的情況
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The physical signs of over-watering are very obvious. The surfaces are light in colour, often whitish, and very variable. Water accumulates in low spots and produces distinctive tide marks as it evaporates away. The excess water disrupts the viscosity properties of the leveller so that the coarse grains settle to the bottom and the fines go to the top. This stratification results in changes to the surface hardness and drying properties of the leveller. The fines at the surface are weak and soft, leading

目視很容易就可察覺加水過量的情況，自流平乾固後顏色偏淺甚至發白與正常水量自流平產生差異，水份堆積在較深的低窪處隨著水份蒸發會在表面形成如潮汐狀痕跡，過量的拌合水將導致自流平材料中的分層造成粗骨料下沉，細料上浮，分層現象會導致乾燥時間延長且表面鬆散無強度，與面層材料接著性差等問題，不同均質的自流平層還有乾燥時收縮不一的情況造成開裂，壟起，與基層脫膠等後遺症

to indentations and possible de-bonding of the adhered floor covering. The different layers have varying degrees of shrinkage on drying which can lead to cracking, concave cupping and de-bonding of the topping.

Excessive water application leads to overall shrinkage problems, but also greatly retards drying of the levelling cement, which effectively negates the advantages of the ARDURAPID technology used in Ardex levelling products.

The following examples are case histories where over-watering has been responsible for the creation of problems on site. In each case the complaint was investigated by Ardex Technical Services and the major contributing factor to the problem identified. As noted above, the signs of over-watering are easy to recognise and can be seen in the illustrations.

過量加水肯定加大收縮量及延緩自流平乾固時間，如此一來亞德士引以為傲的“自凝快乾”技術所訴求的優勢將蕩然無存，下列記錄中清楚顯現過量加水所引發的種種問題



An example of a home made gauging bucket, which can result in variable or inaccurate water dosages unless carefully cut and used.



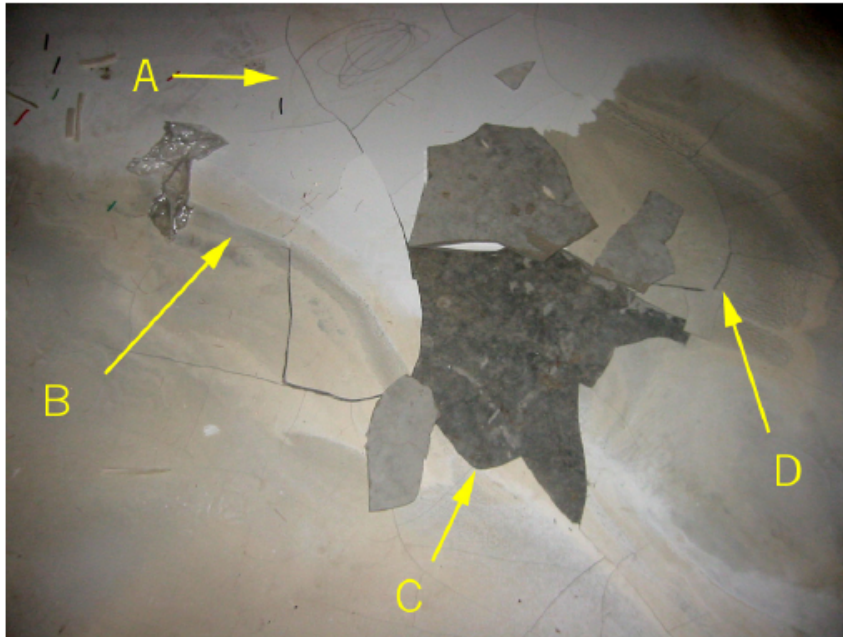
✓ Above is the standard Ardex gauging bucket.

自製量水桶，隨意切割，用水量難以掌握

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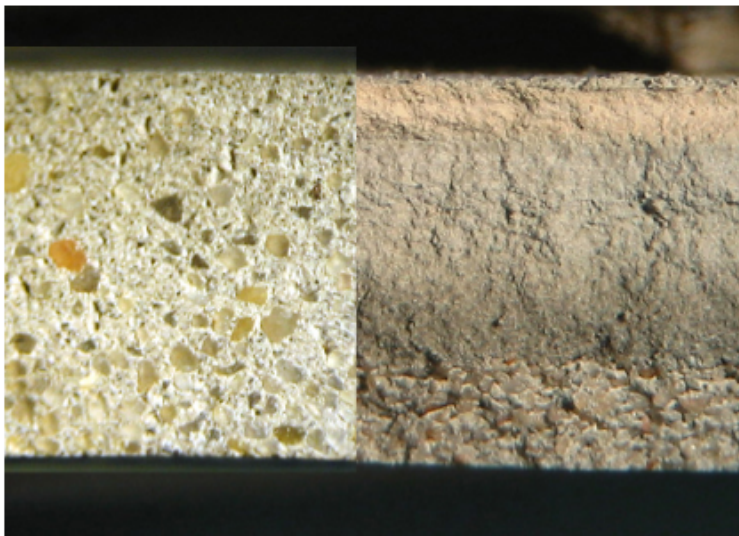
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Classical signs of over-watering product.

- A- Light discolouration which is made up from fines on the surface.
- B- Water marking
- C- Sheet de-bonding off floors
- D- Polygonal shrinkage cracking

明顯易見的過量加水 A/ 顏色偏白, 表面僅為細料 B/ 水痕 C/ 表面材脫落
D/ 塊狀收縮開裂



Samples of product returned from job sites.

The sample on the left is normally water Ardex levelling cement

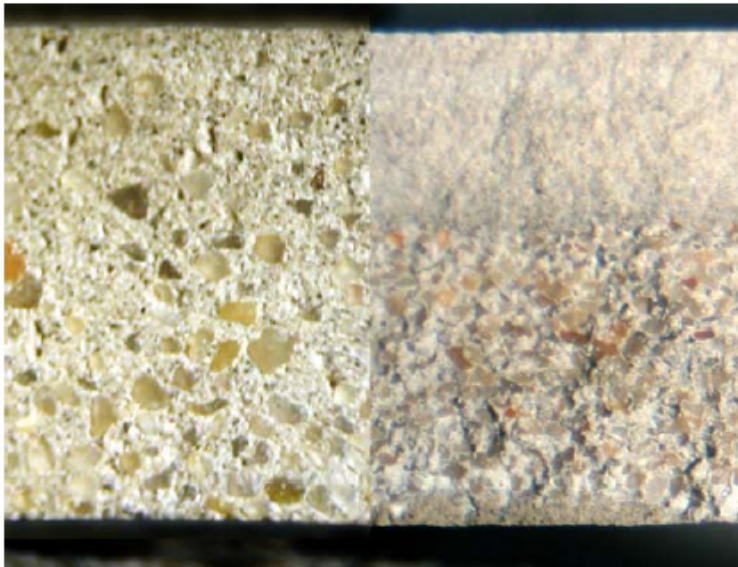
The sample on the right is ARDEX V900 which has been over-watered by approximately 100%

橫切面清楚顯示過量加水所導致的分層；使用材料為 ARDEX V900
左側樣塊為正常水量, 右側過量加水幾乎達兩倍

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The right hand sample is ARDEX CL11 over-watered by approximately 50%.

The obvious feature of both of these returned samples is the degree of particle segregation. The pale colour at the top is weak and soft.

右側為 CL11 加水過量約 50%，加水過量將導致分層且自流平表面強度降低

Why do floor layers over-water?

- ✘ Wrong water gauging buckets used (not calibrated).
- ✘ Don't know the correct water amount (haven't read the bag instructions).
- ✘ To try and 'improve' the product flow.
- ✘ To try and re-invigorate mixed leveller that has started to cure.
- ✘ Assumption that levellers are like concrete and can have some extra water added for workability.
- ✘ Bad mixing techniques or mixers.
- ✘ Too much haste in adding the mix water.

When mixing always use clean water and do not use water that has mud or dirt in it, or has been used for clean up. In rural areas avoid the use of bore water which contains mineral salts, and may be alkaline, acid or heated.

地坪施工為什麼會多加水？

取水量桶不夠精確

不知道正確的用水量，不閱讀產品包裝說明

想增加自流平的工作度加大坍流度

桶中待料時間過長想再加水使用

認為與一般混凝土沒多大差異，多加點水以增加其工作度

攪拌機具差

加水隨意，過快

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拌合水應為常溫乾淨自來水必免使用髒水污水及含礦物鹽及酸鹼質過高的生水
Mixing technique and equipment

The Ardex recommended mixer is a paddle type which breaks up lumps and makes a good vortex into the mix. Many layers use a spiral type of the mixer which is really designed for surface coatings. In Ardex's experience, this type of mixer does not

攪拌技巧及工具

亞德士所建議的攪拌頭為”全橄欖”或”半橄欖”支條狀攪拌頭,可以產生最佳攪拌旋渦輕易的分散結塊,許多施工者所使用的螺旋槳狀攪拌頭其效果對粘稠度較高的自流平不是很好,拿來攪拌自流平時也較容易損壞馬達,

adequately break up lumps, or create a sufficient vortex to turn over the viscous cements. When using bulk fills, the spiral mixers do a poor job and tend to overwork the mixer's electric motor.

Where the mixer is fixed to the side of the mixing container, cement builds up on the sides in unmixed and hard lumps which can then drop into the mixed material and end up on the floor. A hand held heavy duty drill/mixer will allow the user to scour the sides of the bucket and the base to ensure thorough mixing.

當使用固定式攪拌機具時,料倉周邊所堆積的未完全拌合的乾粉經過幫送可能造成自流平表面”粉包”的情形,相對的即使是使用手提式電動攪拌機具,在桶邊及桶底的乾粉積料也同樣有可能造成結塊及分散不均,攪拌時應養成不時清理桶邊及刮除桶底積料的習慣將有助於攪拌的確實

Poor mixing, and not mixing for the recommended 2 minutes has several side effects;

- ✘ It can lead to localised over-watering.
- ✘ The formation of un-mixed lumps and segregation.
- ✘ Does not allow special additives in the leveller to disperse and react properly, altering flow and viscosity.
- ✘ *Do not use concrete mixers with levelling cements.*
- ✘ *Do not over mix.*

攪拌不確實及攪拌時間不足將造成下列缺陷

- 局部水灰比的偏差
- 結塊及”粉包”的產生,甚至分層
- 膠粉助劑等分散不均勻影響稠度及流平性能
- 勿使用混凝土攪拌機械進行自流平施工
- 勿過度延長攪拌時間

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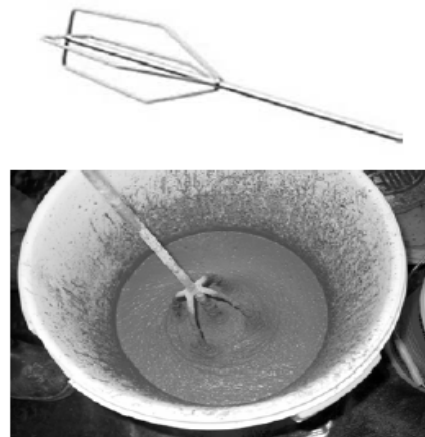


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✘ The above picture is a spiral type mixer which is not preferred by Ardex for its products.

螺旋狀攪拌頭，不太適合自流平水泥的攪拌



✓ The Ardex mixing paddle, and mixing of DPF005 with the paddle and a heavy duty drill.

轉速扭力功率大配合正確的攪拌頭方能事半功倍

LAYING STAGE

Weather Conditions

The first thing to consider is the weather conditions. If it is below 10°C there will be delayed curing, and at 5°C and less the reactions stop. Above 30-35°C, the levellers react very quickly which limits working time significantly and can result in premature hardening on the floor and poor workability.

The poor practices that occur in this situation tend to be at the high temperature end where extra water is added to help workability – leading to over-watering. At the low end heaters may be used which leads to over-rapid drying with possible surface cracking.

Refer to Ardex Technical Bulletins TB020, TB022 and TB097 for advice.

下料施工階段 氣候條件

溫度是首先考慮的因素，10°C以下自流平凝結乾固將會延緩，5°C以下基本上自流平水化反應就處於停止狀態，當溫度在30°C-35°C時自流平反應加快對操作人員將造成困擾沒有足夠的時間去進行整平動作，一般常見的錯誤作法有，在高溫時施工工人常常多加水用以維持工作度，在低溫時使用加溫設備如散熱片，暖爐及下吹式空調等，如此將造成局部區域過快乾燥進而在表面形成開裂
相關議題請參考 TB020, TB022 及 TB097

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Laid Thickness of material

The levelling products are designed to be laid at certain thicknesses, and it must be borne in mind that these are toppings, and not slabs. The products ARDEX K15 and K500 are not thickness restricted, whilst ARDEX DPF005 is limited to 120mm maximum. The other levelling cements generally are designed to be laid less than 35mm, and a number less than about 8-10mm. Addition of aggregate varies the thicknesses allowed for certain products and these are listed in the product datasheets, and Ardex Technical Bulletin TB102.

When products are laid in excess of their recommended thickness there can be problems with;

- ✘ Slow drying
- ✘ Shrinkage cracks leading to de-bonding
- ✘ In some cases high temperatures generated during curing can affect adhesion.

施工厚度

亞德士所有自流平在研發時都有一定的厚度設計，請記住自流平不是混凝土，在厚度限制上，K15 及 K500 幾乎可以隨心所欲，DPF005 則限制在 120mm 以下，其餘多半單次施工限制在 35mm 以下，有的甚至祇能做到 8-10mm 厚度，某些產品還允許在一定條件下現場加砂的可能，請參考各產品說明書及 TB102

當施工厚度大於所建議的厚度時將導致

- 乾固速度緩慢
- 收縮開裂甚至脫膠
- 過量的水化熱影響接著

These problems can be avoided by -

- ✓ Selection of the correct product for the job, and not just whatever happened to be cheap or available at the time.
- ✓ Use a bulk fill product for high thicknesses to reduce cost, as well as technical reasons.
- ✓ Use the higher performance products for deeper fills such as ARDEX K15, K500 or DPF005.
- ✓ Follow recommended maximums for ARDEX V900, ARDITEX, K10, A45 and LQ92.
- ✘ Do not lay excessive thicknesses of ARDEX Z8, V900, ARDITEX, CL11 or FEATHER FINISH.

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下列建議可以避免問題的產生

適當的選用材料而不是僅考慮成本

從成本控制及技術層次上使用適當的墊層材料以構築所需施工厚度

K15, K500 或 DPF005 較適合厚度大的施工所需

嚴格按照各產品的建議施工厚度進行施作



An example of material used above recommended thickness. In this case the product is ARDEX A45 used above the recommended maximum thickness of 20mm without a filler aggregate.

During curing the cement can become quite hot and produce tensile strains which can result in some cracking or possible de-bonding from lower strength substrates.

A45 建議施工厚度在不加粗骨材情況下為 20mm，過厚時其固化過程中水化熱過大產生過量的收縮應力將導致開裂，基面強度不足時有可能造成脫膠情形產生

Conversely, where laying a leveller over an impervious surface too thin an application can cause some problems as well. The final surface is then not porous enough for certain types of water based adhesives.

反過來說當自流平在密實基面上厚度太薄時也可能造成一定的困擾，自流平表面將過於緻密，孔隙不足對某些水性面材粘結劑也會造成接著的問題

Over-working the leveller on the floor

In terms of the finished floor, over-working has effects which can be visually indistinguishable from over-watering with many of the same problems.

Flowable grade floor levellers are basically designed to be poured out, raked once or twice with the thickness rake to adjust depth, and then given one or two passes with the spreading trowel to smooth out edges and ripples.

However, layers may decide the material needs to be 'worked' and will drag the trowel back and forth, and do multiple passes over the leveller. At the same time they might walk back several metres into the laid area and 'adjust' a small irregularity. The first practice results in the fines being brought to the surface, segregation and a weak top layer. The second can end up producing marks in levellers that is on the way to initial set, which then have to be 'worked' again.

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過度操作自流平

過度操弄或操作自流平不像過度加水那樣容易可以目視辨別,但同樣會造成許多問題,自流平漿體的設計在施工上應該只是簡單的澆置在地面上後先以厚度控制刮扒拖整一次到二次後再以平板刮板順平接痕即可

但在現場施工時往往操作工人會不自主習慣性的以刮板來回整平漿體表面,此動作會將自流平的細料帶至表層造成漿料分層的結果,另外還會發生的狀況是在一定時間後操作人員還走回已開始初凝的漿料中試著去拖平先前留下的痕跡,其結果大概得重做才成

- ✘ Don't over-work the material.
- ✓ One or two passes of the trowel only (or spiked roller for ARDITEX).
- ✘ Don't walk into laid leveller more than 5 minutes old.
- ✓ Do wear studded footballs boots.

別過度操弄漿體

一到二次迅速刮整即可

漿體下地五分鐘以上區域別在重複刮整了

整平刮板操作人員最好穿著圓型塑膠釘底足球鞋

Laying Toppings over Joints

Movement and construction joints are just that, they are designed to allow for building elements to move around independently. Some clients request that joints are covered by the floor covering, be it vinyl, carpet or tiles.

This practice must be condemned as any movement in the subfloor will crack through the leveller, and result in cracking or de-bonding of tiles, lumps in carpets, and depressions or tears in the vinyl.

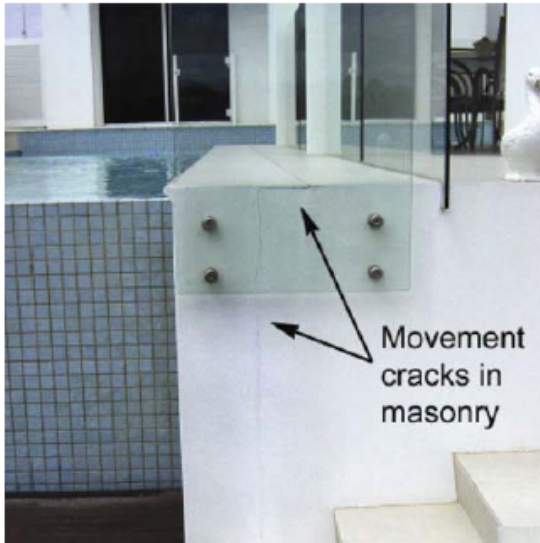
接縫處施作自流平

結構體伸縮縫或收縮縫,其設計本義就是得留置出來,讓建物結構有機會”活動”,有些客戶卻要求將其完全覆蓋,這種做法絕對會造成問題,首先是自流平將會開裂,表面材可能會被拉裂,脫膠,起皺凸起等後遺症

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This picture illustrates the dangers of covering movement joints. In this case the joint is the boundary of the pool structure and the tiles have been applied along the joint rather than a flexible system. Fortunately the tiles did not crack, but de-bonded and the crack follows the grout line.

照片中覆蓋在伸縮縫上的瓷磚延磚縫被拉扯開裂

Movement joints must be correctly detailed with the leveller diamond cut through and flexible sealants or proprietary joint strips or systems used for the carpet/vinyl.

Premature laying of coverings

The last thing that is done is to lay the floor covering. If the leveller has not fully cured, this can lead to moisture problems, mainly with vinyl flooring, though carpet glues are affected as well. The rapid set technology levellers, are alright to lay vinyl on after periods of time that vary between 30 minutes and 24 hours, depending on

澆置在伸縮縫上的自流平必須以圓鋸機延縫走向切開挖除後再以彈性矽膠予以填補或是以地毯或是彈性地板相配收邊配件予以適當配置

the product. Hydration products require between 2 and 3 days to cure and will remain damp in this time period.

過早覆蓋地面裝飾材

倘若在自流平未完全養護的情況下就進行地面裝飾材的覆蓋施工，殘存的濕氣將會造成某些地板膠脫膠及彈性塊材或卷材因濕氣蓄集的凸起現象，一般水泥基自流平在澆置後2-3天內其所含濕氣基本上都不允許廠商進行後續施工，亞德士所掌握的快凝自乾技術可大幅降低等待時間，依產品的不同可讓施工者在30分鐘至24小時後接續作業

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USING THE WRONG PRODUCTS FOR AN APPLICATION

There is a temptation to use what is available in the back of the truck, or what is the cheapest product, which can lead to problems. Some products are more flexible in their applications than others, for example ARDEX ARDITEX can be used in many environments, but some levellers are more specialised and should be used in their correct usages.

Another temptation is to be creative with products and use them in ways other than intended, which may or may not work.

Each of the products in the Ardex flooring range has particular attributes, though there is a degree of overlap between them in applications. The product bags and the datasheets describe the use for each leveller, but the following rules apply.

Remember, the majority of Ardex's products are for internal applications only.

- The only products rated for external usage as underlayments are ARDEX LQ92, ARDITEX and ARDEX DPF005.
- The only externally rated product exposed to weather is ARDEX 200.
- The only products which can be considered wear surfaces are ARDEX K500 and ARDEX 200.
- ✘ Ardex neither warrants nor recommends the use of ARDEX K15 as a wear surface or 'feature floor'.
- ARDEX LQ92 and DPF005 can be used in wet areas to level and create falls.
- ARDEX K15, K10 and ARDEX A45 can be used in internal wet areas under suitable membranes with sheet vinyl floor coverings.
- ARDEX K15, K500 or K10 mixed with ARDEX E25 are recommended for heavy duty vinyl installations in supermarkets, commercial premises or institutions.
- ARDEX K15 mixed with ARDEX E25 or ARDITEX are rated for flexible surfaces such as Compressed Fibre-Cement or timber.
- The only products which can be laid over suitable Ardex flexible membranes are ARDEX ARDITEX or ARDEX FEATHER FINISH.

錯誤選用產品

通常狀況是倉庫裡有什麼產品就使用什麼產品或是因為價格的問題就選擇了最低單價的產品予以施工，這種行為很可能造成施工方更大的損失，風險極大，所有的亞德士自流平其設計功能及物性表現都有差異，有的僅能做為下地材使用，有的能做為表面材使用，有的能符合快速施工的要求，有的能做為室外使用，有的具有高抗折能力或做為墊層使用等

唯有在施工前充份瞭解業主要求及將來投入使用的條件下，正確選用產品才會有令人滿的結果

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An example of a poor choice of product. ARDEX K10 was laid on a floor that was subject to continuous disinfectant washing under water resistant carpet.

The K10 had no form of membrane or protective coating and the K10 degraded over time. Eventually the topping de-bonded in patches from the subfloor.

防水地毯經常性的消毒清洗, 所選用的自流平為 K10 並無塗層保護的情況下, 一定時間後造成表層漿體分離(不耐水) 最終導致自流平基材與面材脫膠

CONCLUSIONS

When used within Ardex recommendations and correct industry practices, Ardex flooring products perform at the top end of the market and provide a strong and durable surface for flooring, which have been proven in service since 1949.

When poor practices are used, some of these products will tolerate a degree of abuse, but others will not and bite the installer hard. The financial cost of being bitten is high as we have already mentioned, and the best way to avoid this is to follow good practice, read the product literature, and insist that specifications are followed when doing an installation.

It is in the installer's best interests to encourage builders and specifiers who may have contracted them onto a job, to allow for the full set of correct procedures to be followed.

結論

正確的選用自流平材料及扎實的基層準備及精準的施工將是自流平工程成敗的重要關鍵, 亞德士自 1949 年以來在自流平專業領域內一直以其專業技術服務客戶且受到廣泛的認同,

當施工誤差發生時, 視材料選用的不同某些錯誤可被包容但有些錯誤將導致施工商嚴重的品質問題及可能的返工經濟損失, 唯有小心謹慎的選擇材料及處理施工作业才是上策, 過份的牽就業方不合適的要求及工序上不合理的安排很難將工程做好

技術佈告屬內部指導檔。不能代表所有工地現場實際施工時所發生的情況
請勿將技術佈告內容做為施工時唯一依據