



## TECHNICAL BULLETIN – TB159

### ISSUES WITH SAND CEMENT SCREEDS AS SUBSTITUTES FOR NON-CERAMIC TILE FLOORING SYSTEMS

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#### INTRODUCTION & SCOPE

From time to time, ARDEX encounters jobs where resilient flooring such as sheet or strip vinyl, linoleum, bonded timber, or a coating system such as an epoxy has been specified to be applied over a sand-cement screed. This bulletin discusses some issues and problems with this substrate when used with vinyl floor coverings.

#### WHAT SORT OF SCREEDS ARE WE DESCRIBING?

For the purposes of this discussion, we are referring to screeds made from mixes of quartz sand-Portland cement, typically used for tile installations in the ratio of 1 part cement to 3 or 5 parts sand by volume, mixed with sufficient water to make the material workable. Typically, screed thicknesses are 15 to 40mm for bonded screeds and a minimum of 40mm for un-bonded self-supporting screeds (as defined in AS3958.1).

This discussion is not directed towards true concretes (sand-cement-gravel), ARDEX liquid-applied leveling compounds, or ARDEX specialized high-strength screeds such as ARDEX A38.

#### WHAT DOES THE STANDARD SAY?

The 2021 revision to AS1884 makes the following comments about sand-cement screeds.

##### **3.2 Sand-cement Screed subfloors**

*Sand-cement screed subfloors shall not be used for the installation of resilient flooring and their preparation products. This form of subfloor does not possess the required tensile and compressive strength for resilient floor covering installation.*

##### **3.3 Engineered screed subfloors**

*In areas where falls to wastes are required, an engineered screed or an appropriate underlayment or repair mortar for that application in accordance with the dry mix powder manufacturer's instructions shall be used or the falls to waste may be formed in the actual concrete slab.*

*Where the resilient flooring is being installed where falls to waste are required the system installed shall conform to AS 3740.*

*An engineered screed may also be used for filling set-downs and in unbonded situations*

#### WHAT ARE THE ISSUES?

Whilst the standards committee has made this concession due to lobbying by builders and the construction industry, ARDEX has found that this type of substrate is generally not satisfactory for several reasons.

1. The drying time of screeds is one millimetre of screed thickness per day to reach an acceptable moisture content figure (as defined in AS1884-2021, which has tighter requirements than the 2012 version). This means that vinyl typically cannot safely be laid for anywhere from 40 to 60



days after the screed is placed, depending on screed thickness. If the flooring is applied directly over the 'young screed,' there is a risk of the development of moisture-related de-bonding of the adhesive and blisters in the vinyl or coating. This prolonged drying also means the job can be delayed until a satisfactory measured moisture content is reached. Whilst this moisture issue can be alleviated with a coating of ARDEX WPM300 water-based epoxy sealer, such a process does not cure problems such as 2 and 3 below.

2. ARDEX has seen several institutional wet area installations where vinyl flooring has been applied over sand-cement screeds. Whilst the screed might be initially 'rock solid,' the point loading of wheelchairs, commode chairs, and trolleys, as well as the shearing forces these devices create when turning, eventually cause it to break down and fail. The vinyl then breaks away from the weakened surface, taking the top layer with it.

ARDEX has also inspected installations where epoxy coatings have lifted the top off the 'screed' in sheets due to drying tension and where bonded timber has torn chunks out of the screed when it has moved after being subjected to moisture change-related movements.

Whilst concrete typically has compressive strengths from 20MPa upwards (minimum required), sand cement screeds are commonly in the range of 1 to 5MPa, so they are not very strong. To some extent, low strength can be improved by using additives such as ARDEX Abacrete or ARDEX WPM405 to the gauge water, but this still does not increase the strength to that of sound concrete or get around slow drying and cure. To achieve even 10MPa is not easy with sand-cement, and to have a hardness of 20MPa or tensile of 1.5MPa requires correct densification and good compaction, which is rare in the Australian building environment.

The low strengths usually seen are not as problematic when installing a hard floor covering such as ceramic tiles. However, when a thin, soft covering such as vinyl or low-thickness epoxy coating is used, loads are applied more directly to the screed.

3. Sand-cement screeds suffer from great variability in properties, including sand-cement ratios, quality of mixing and degree of aeration, degree of compaction, and amount of gauge water used. These variability issues make sand-cement screeds unsuitable for the direct application of thin floor coverings where a consistent and sound substrate is required.
4. Sand-cement screeds often do not provide a sufficiently flat-smooth surface for vinyl where even small irregularities can show through. The required flatness and smoothness defined in AS1884-2021 are:

#### **3.1.4 Surface quality**

*The surface of a concrete subfloor shall be thoroughly checked for the following:*

- a) **Planeness** — Refer to manufacturer's planeness instructions. Where no manufacturer's instructions are supplied, and a straightedge 2,000 mm long is placed at rest at any two points over a 2,000 mm distance, no part of the surface shall be more than 4 mm below the straightedge.
- b) **Abrupt deviation tolerance** — Where a straightedge 150 mm long is placed at any position at rest at two points on the surface, no abrupt surface deviation shall be more than 0.5 mm below the straightedge.
- c) **Smoothness** — The surface shall be regular with no holes, lumps or sudden rise or fall and with homogenous appearance.
- d) **Soundness** — The surface shall be without cracks, crazing, dusting, rain damage, spalling, efflorescence or blistering.



## IMPORTANT

It should also be noted standard sand-cement screeds are not suitable substrates for ARDEX Levelling Compounds to be applied over, and ARDEX reserves the right not to make recommendations for or warrant its flooring products where sand-cement screeds have been installed as the base.

Engineered screeds, underlayments, or repair mortars must not be applied over a waterproofing membrane. The waterproofing membrane must instead be installed over the engineered screed, underlayment, or repair mortar. For advice on suitable systems for your specific application, please contact ARDEX Technical Services.

## WHAT IS THE SOLUTION?

### *Thinner layers 3-12mm*

The recommended ARDEX levelling compounds for installing resilient flooring, timber, or coatings are based on application over a rough concrete substrate. The levelling compounds provide a smoother, flatter, harder, stronger and more homogenous surface. More critically, the levelling compounds cure in as little as 60 minutes, or up to 48 hours for the slower products, which means the job is not held up waiting for the substrate to dry. ARDEX levelling compounds offer superior performance to sand-cement screeds and are acceptable underlayments under Australian floor covering standards.

### *Thicker layers >10mm*

- a) Where there is an existing screed of significant thickness, a cost-effective solution is to replace it with either ARDEX Bulk Fill K900BF or an aggregate-filled smoothing cement. The surface can then be smoothed with a thin layer of an ARDEX levelling compound, ARDEX Feather Finish or ARDEX MRF.
- b) ARDEX A38 rapid cure, high-strength screed can be used for thicknesses from 15mm upwards as a bonded screed or >40mm for an unbonded screed. The ARDEX A38 powder is based on high-strength Ardurapid cement and is mixed with a graded sand-fine gravel bulk filler. Strengths of >40MPa can be achieved, and drying times under 12 hours are possible before floor coverings. As a base coat, they are also strong enough to take levelling compounds or industrial high-build coatings.

#### **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 Office.

#### **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.

#### **REASON FOR REVISION-ISSUER**

Change of slogan, address and screed data

#### **DOCUMENT REVIEW REQUIRED**

36 months or whenever third-party suppliers change their recommendations.

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